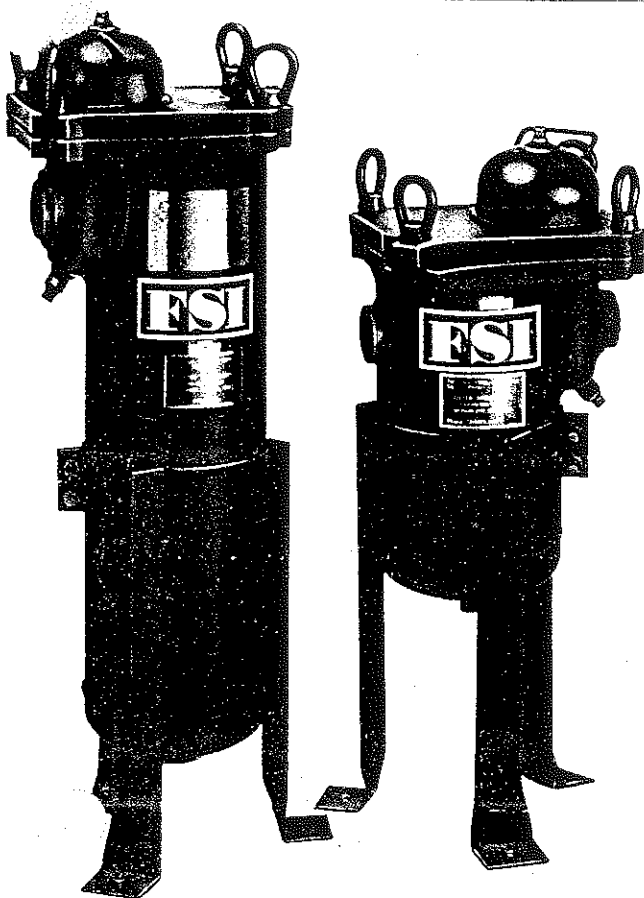




# SINGLE BAG FILTER VESSELS

MODELS  
FSP-40  
AND  
FSP-85



Model FSP-85  
Style 1

Model FSP-40  
Style 4

## MODEL FSP-40

Features up to 4" full port that permits non-restricted flow. Straight in-line design available. Makes manifolding easy. New basket design eliminates need for gaskets. Designed for continuous flow up to 100 GPM and small-batch operations. Requires one size #1 filter bag.

## MODEL FSP-85

Features up to 4" full port that permits unrestricted flow. Straight in-line design available. Makes manifolding easy. New basket design eliminates need for gaskets. Designed for continuous flow up to 200 GPM and batch operations where Model FSP-40 does not have the capacity. Requires only one size #2 filter bag.

## STYLES

The new models FSP-40 and FSP-85 are available in styles shown on the opposite side of this page.

## TYPICAL APPLICATIONS

Typical applications for both the FSP-40 and FSP-85 include paints, chemicals, inks, coatings, resins, solvents and adhesives.

## FILTER BAGS VS. CONVENTIONAL CARTRIDGES

Model FSP-40: Performance of the FSP-40 is equal to approximately six to nine (6-9) conventional 10" cartridges.

Model FSP-85: Performance of the FSP-85 is equal to approximately twelve to eighteen (12-18) conventional 10" cartridges.

## SPECIFICATIONS

Model No.	No. of Filter Bags	Bag Size No.	Surface area Per bag, ft. <sup>2</sup>	Surface area per filter, ft. <sup>2</sup>	Inlet and Outlet Size	Max. flow rate, GPM
FSP-40	1	1	2.0	2.0	1" thru 4"	90
FSP-85	1	2	4.4	4.4	1" thru 4"	200

Maximum flow rate is based on aqueous flow at 1.0 PSI  $\Delta$ P clean through vessel only without bags installed.

## ADDITIONAL FEATURES

- Single gasket seal
- Positive bag sealing
- Easy access for fast cleaning
- Permanent piping
- Heavy-duty baskets (standard)
- New float evacuation system (optional)
- Can be supplied with steam jackets, extra-length legs and corrosion allowance
- Mesh lined baskets available for straining applications
- Data obtained using the FSP-40 or FSP-85 filters can be extrapolated to estimate the performance of larger FSI filters

## SPECIFICATIONS

- Standard 2" inlet & outlet
- Specific locations and sizes up to 4" available on request
- 4 standard styles
- Stock vessels available in:
  1. Carbon steel
  2. 304 stainless steel
- 316 stainless steel and electroless nickel plated carbon steel vessels available on request
- Standard 150 or 300 PSI ASME code stamp (meets OSHA requirements) or customer specification
- Filter bags available rated 1 to 1500 microns
- Gasket materials include Buna N, Neoprene, EPR, Viton, Teflon

There are no expressed or implied warranties, including the implied warranty of merchantability and fitness for a particular purpose not specific herein respecting this agreement or the product being sold hereunder or the service provided herein.



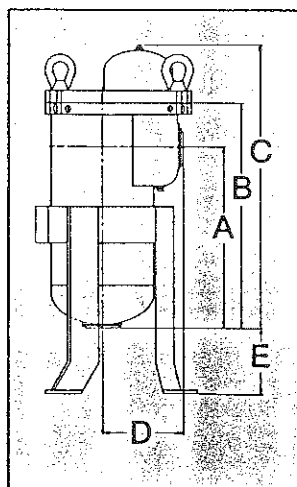
# FSP-40 AND FSP-85 DIMENSIONS

## Dimensions nominal, not to be used for installation purposes

### STYLES

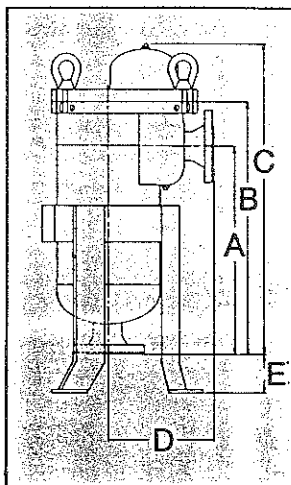
Styles one thru four (1-4) are shown below (available for both the FSP-40 and FSP-85).

Dimensional drawings, styles 1, 2, 3 & 4



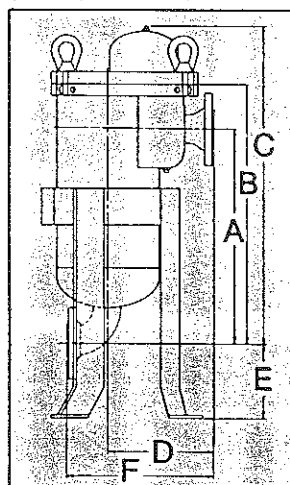
Style 1

(2" NPT Fittings)



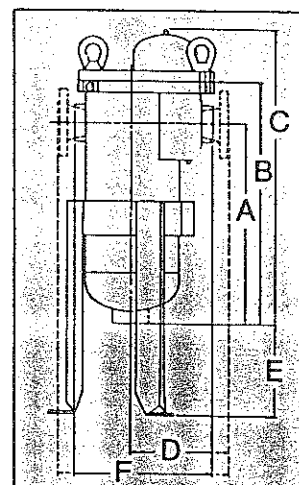
Style 2

(2" Flanged Fittings)



Style 3

(2" Flanged Fittings with 90° Elbow)



Style 4

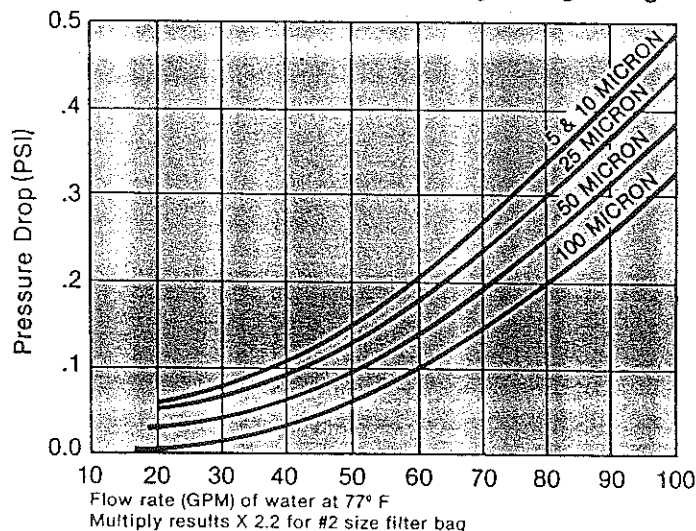
Inline 2"  
NPT or Flanged

### FSP-40 and FSP-85 dimensions

MODEL NO.	A	B	C	D	E	F
FSI	13 1/4"	17 1/4"	21 1/4"	7 1/4"	9 1/4" - 12 1/4"	N/A
40-2	15 1/4"	19 1/4"	23 1/4"	9"	7 1/4" - 10 1/4"	N/A
FSP-40-3	15 1/4"	19 1/4"	23 1/4"	9"	6 1/4" - 9 1/4"	12 1/2"
FSP-40-4 NPT	13 1/4"	17 1/4"	21 1/4"	7 1/4"	9 1/4" - 12 1/4"	13"
FSP-40-4 FLG	13 1/4"	17 1/4"	21 1/4"	9"	7 1/4" - 10 1/4"	15 1/4"
FSP-85-1	26 1/4"	30 1/4"	34 1/4"	7 1/4"	0 - 12 1/4"	N/A
FSP-85-2	28 1/4"	32 1/4"	36 1/4"	9"	0 - 10 1/4"	N/A
FSP-85-3	29 1/4"	33 1/4"	36 1/4"	9"	3" - 9 1/4"	12 1/2"
FSP-85-4 NPT	26 1/4"	30 1/4"	34 1/4"	7 1/4"	0 - 12 1/4"	13"
FSP-85-4 FLG	26 1/4"	30 1/4"	34 1/4"	9"	0 - 10 1/4"	15 1/4"

Dimensions shown are for 2" fittings.

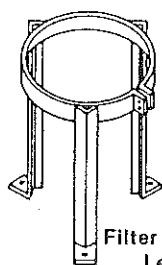
### Filter bag performance data for single-length bags



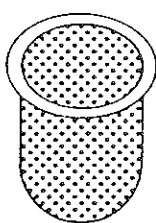
Note 1: For recommendations on which bag or filter housing material to use, and for complete technical data or pressure drop and flow rate — also how to size FSI bag filters — contact your FSI representative or FSI direct.

Note 2: 2" NPT drain standard on style 4 vessels.

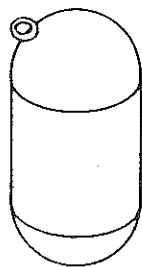
Note 3: Customer to specify piping size and type connections if different from standard 2".



Filter Vessel  
Legs



Heavy-duty  
restrainer basket



Evacuation float  
(accessory)



filter specialists, inc.

100 Anchor Road  
P.O. Box 735  
Michigan City, Indiana 46360  
219/879-3307

Distributed by:



# Series 80D, Model 8008



MODELS	
PRIMARY	SECONDARY
454	807

HUB CITY LUBRICANT RECOMMENDED.  
(REFER TO PAGE L-20.)

DRY SHIPPING WEIGHT 991 LBS.

NOTE: ASSEMBLIES, LA-L, LB-L, RA-R, RB-R, ARE NOT AVAILABLE DUE TO INTERFERENCE BETWEEN PRIMARY UNIT C FLANGE AND SECONDARY UNIT SIDE MOUNT FLANGE.





# HUB CITY DOUBLE REDUCTION WORM GEAR REDUCERS

## Series 80D, Ratings

MECHANICAL RATING												THERMAL RATING				
R A T I O	Output R.P.M.	Ratio Combination		SERVICE FACTOR								Ef- fi- ciency %	DESIGN OPTION			
				1.00		1.25		1.50		1.75			Basic Unit		With Synthetic Lube	
		Pri- mary	Sec- ondary	Input H.P.	Output Torque	Input H.P.	Output Torque	Input H.P.	Output Torque	Input H.P.	Output Torque		Input H.P.	Output Torque	Input H.P.	Output Torque
		1750 R.P.M. INPUT SPEED (HIGH SPEED SHAFT)														

### 1750 RPM INPUT SPEED (HIGH SPEED SHAFT)

100	17.5	10	10	16.3	44908	13.04	35926	10.87	29939	9.31	25662	76.5	7.55	20800	6.68	23920
150	11.7	15	10	12.4	47895	9.92	38316	8.27	31930	7.09	27369	71.5	5.35	20670	6.15	23770
200	8.75	10	20	10.4	52384	8.32	41907	6.93	34923	5.94	29934	69.9	7.55	38010	6.68	43710
300	5.83	15	20	7.87	55295	6.30	44236	5.25	36863	4.50	31597	65.0	5.35	37570	6.15	43210
400	4.38	20	20	6.22	56097	4.98	44878	4.15	37398	3.55	32055	62.6	4.53	40850	5.21	46980
500	3.50	10	50	5.12	51217	4.10	40974	3.41	34145	2.93	29267	55.5	4.36	43590	5.01	50130
600	2.92	15	40	5.00	58451	4.00	45761	3.33	38967	2.86	33401	54.1	5.00	58451	NOT REQUIRED	
750	2.33	15	50	3.81	52325	3.05	41860	2.54	34883	2.18	29900	50.8	3.81	52325		
1000	1.75	20	50	3.02	52325	2.42	41860	2.01	34883	1.73	29900	48.1	3.02	52325		
1200	1.46	30	40	3.02	56644	2.42	45315	2.01	37763	1.73	32368	43.4	3.02	56644	2.50 55257 2.21 55257	
1500	1.17	50	30	2.50	55257	2.00	45206	1.67	36838	1.43	31575	40.9	2.30	50820		
1800	.972	60	30	2.21	55257	1.77	45206	1.47	36838	1.26	31575	38.6	2.07	51800		
2000	.875	50	40	2.02	55849	1.62	44679	1.35	37233	1.15	31914	38.3	2.02	55849	NOT REQUIRED	
2400	.729	60	40	1.80	55849	1.44	44679	1.20	37233	1.03	31914	36.0	1.80	55849		
3000	.583	60	50	1.50	54129	1.20	43303	1.00	36086	.857	30931	33.4	1.50	54129		
3600	.486	60	60	1.04	41905	.832	33524	.693	27937	.594	23946	31.1	1.04	41905		

### 1150 RPM INPUT SPEED (HIGH SPEED SHAFT)

100	11.5	10	10	12.1	50977	9.68	40782	8.07	33985	6.91	29130	76.8	6.18	26010	7.11	29910
150	7.67	15	10	8.70	51730	6.96	41384	5.80	34487	4.97	29560	72.3	4.47	26570	5.14	30560
200	5.75	10	20	7.51	57457	6.01	45966	5.01	36305	4.29	32833	69.8	6.18	47280	7.11	54370
300	3.83	15	20	5.25	56097	4.20	44878	3.50	37398	3.00	32055	65.0	4.47	47770	5.14	54940
400	2.88	20	20	4.08	56097	3.26	44878	2.72	37398	2.33	32055	62.7	3.89	53470	4.08	56097
500	2.30	10	50	3.50	52325	2.80	41860	2.33	34883	2.00	29900	54.6	3.50	52325	NOT REQUIRED	
600	1.92	15	40	3.19	55849	2.55	44679	2.13	37233	1.82	31914	53.3	3.19	55849		
750	1.53	15	50	2.56	52325	2.05	41860	1.71	34883	1.46	29900	49.8	2.56	52325		
1000	1.15	20	50	2.02	52325	1.62	41860	1.35	34883	1.15	29900	47.3	2.02	52325	NOT REQUIRED	
1200	.958	30	40	1.95	55849	1.56	44679	1.30	37233	1.11	31914	43.6	1.95	55849		
1500	.767	50	30	1.63	55257	1.30	44206	1.09	36838	.931	31575	41.3	1.63	55257		
1800	.639	60	30	1.50	57857	1.20	44206	1.00	38571	.857	33061	39.1	1.50	57857	NOT REQUIRED	
2000	.575	50	40	1.32	55849	1.06	44679	.880	37233	.754	31914	38.5	1.32	55849		
2400	.479	60	40	1.16	55849	.928	44679	.773	37233	.663	31914	36.5	1.16	55849	NOT REQUIRED	
3000	.383	60	50	.944	52325	.755	41860	.629	34883	.539	29900	33.7	.944	52325		
3600	.319	60	60	.676	41905	.541	33524	.451	27937	.386	23946	31.4	.676	41905		

### 850 RPM INPUT SPEED (HIGH SPEED SHAFT)

100	8.5	10	10	9.11	51730	7.29	41384	6.07	34487	5.21	29560	76.6	5.66	32150	NOT REQUIRED	
150	5.67	15	10	6.36	51730	5.09	41384	4.24	34487	3.63	29560	73.1	4.14	33660		
200	4.25	10	20	5.47	56097	4.38	44878	3.65	37398	3.13	32055	69.2	5.47	56097		
300	2.83	15	20	3.90	56097	3.12	44878	2.60	37398	2.23	32055	64.6	3.90	56097	NOT REQUIRED	
400	2.12	20	20	3.04	56097	2.43	44878	2.03	37398	1.74	32055	62.2	3.04	56097		
500	1.70	10	50	2.65	52325	2.12	41860	1.77	34883	1.51	29900	53.2	2.65	52325		
600	1.42	15	40	2.40	55849	1.92	44679	1.60	37233	1.37	31914	52.3	2.40	55849	NOT REQUIRED	
750	1.13	15	50	2.01	54323	1.61	43458	1.34	36215	1.15	31042	48.6	2.01	54323		
1000	.850	20	50	1.52	52325	1.22	41860	1.01	34883	.869	29900	46.5	1.52	52325		
1200	.708	30	40	1.50	57523	1.20	46018	1.00	38349	.857	32870	43.1	1.50	57523	NOT REQUIRED	
1500	.567	50	30	1.22	55257	.976	44206	.813	36838	.697	31575	40.9	1.22	55257		
1800	.472	60	30	1.07	55257	.856	44206	.713	36838	.611	31575	38.6	1.07	55257		
2000	.425	50	40	.986	55849	.789	44679	.657	37233	.563	31914	38.2	.986	55849	NOT REQUIRED	
2400	.354	60	40	.874	55849	.699	44679	.583	37233	.499	31914	35.9	.874	55849		
3000	.283	60	50	.706	52325	.565	41860	.471	34883	.403	29900	33.3	.706	52325		
3600	.236	60	60	.508	41905	.406	33524	.339	27937	.290	23946	30.9	.508	41905		

OVERHUNG LOAD-LOW SPEED SHAFT — MODELS 8001 AND 8004 7,000 LBS. AT CENTER POINT OF SHAFT EXTENSION.  
 MODELS 8007 AND 8008 — OHL\* 9,800 LBS., TO\* THRUST OUT 8,300 LBS. AND T1\* THRUST IN 6,500 LBS.  
 MODELS 8009 AND 8010 7,000 LBS. AT CENTER POINT OF SHAFT EXTENSION. THRUST\* UP OR DOWN 6,500 LBS.  
 \*OHL and Thrust values shown are independent functions and cannot be applied simultaneously. Refer applications with combined OHL and Thrust to Hub City Customer Service Department.  
 Thermal capacity can be improved on some applications with the addition of a fan on the primary unit. Consult Hub City Customer Service for specifics.





# Tank Protection

## Division

### FLAME ARRESTERS

## MODELS 7618/7628

- ☐ Sizes 2" through 60"
- ☐ Available in, carbon steel, stainless steel aluminum (type 356) and other materials
- ☐ Wafer design for quick and easy maintenance
- ☐ Unique recessed seating for superior protection
- ☐ Factory Mutual approval for most sizes and materials
- ☐ Proven spiral wound, crimped ribbon, flame element

### FLAME ARRESTER

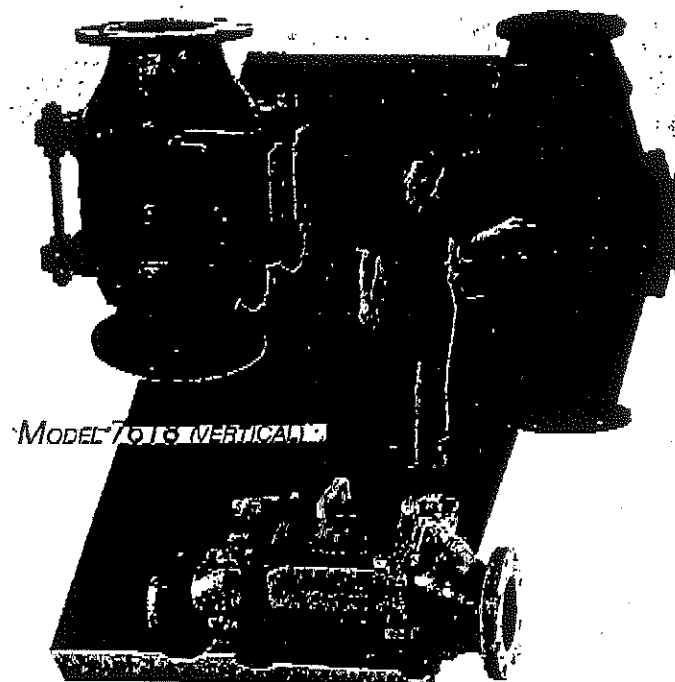
Both models are designed to inhibit flame propagation in gas piping systems and to protect low pressure tanks containing flammable liquids. Arresters protect low flash point liquids from externally caused sources of heat and ignition. This provides increased fire protection and safety.

### SPECIAL FEATURES

Both models are built of corrosion resistant materials throughout. Wafer design construction affords easy accessibility to the flame bank. Additionally, jack screws aid in the removal from the shell assembly. All Groth flame arrester flame banks utilize spiral wound, crimped ribbon constructed flame elements. These proven, Factory Mutual approved elements have been reported, by NTIS of the Dept. of Commerce, to provide the best flame quenching performance for the least pressure drop. Groth's special recessed flame bank seating construction uniquely provides an extra measure of protection against leakage and possible flame propagation.

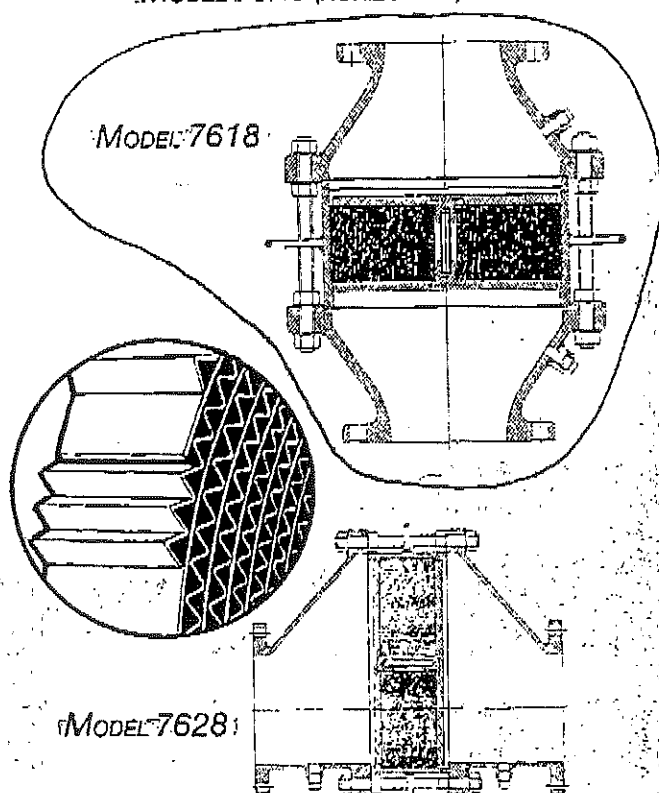
### GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Flame Arrester is factory inspected and tested to meet all critical requirements and special needs. Inventory is maintained to insure rapid delivery.



MODEL 7618 VERTICAL

MODEL 7628 (HORIZONTAL)



MODEL 7618

MODEL 7628

Note: All Groth Flame Arresters are Bi-directional. Factory Mutual regulates that Flame arresters be installed with 10 pipe diameters of the source of ignition.





# VACUUM CAPACITY FOR VENT & FLAME ARRESTER COMBINATION

## VACUUM RELIEF CAPACITY

### MODEL 1220A/7618

Set Vacuum (P <sub>s</sub> )		Air Flow Capacity at 100% Over-vacuum (Double Set Vacuum) 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2"	3"	4"	6"	8"	10"	12"
0.87	0.50	2.55	5.19	8.80	17.9	28.6	44.3	53.6
1.00	0.58	2.77	5.73	9.70	19.8	31.6	48.9	60.4
1.73	1.00	3.78	8.15	13.6	28.3	45.1	69.4	89.8
2.00	1.16	4.10	8.90	14.9	31.0	49.3	75.8	99.0
2.60	1.50	4.74	10.4	17.4	36.2	57.7	88.6	117
3.00	1.73	5.14	11.3	18.9	39.5	62.9	96.0	128
3.46	2.00	5.56	12.3	20.5	42.9	68.4	105	139
4.00	2.31	6.03	13.4	22.3	46.7	74.4	114	152
6.00	3.47	7.54	16.9	28.1	58.9	93.8	144	193
8.00	4.62	8.84	19.9	33.0	69.4	110	169	227
10.0	5.78	10.0	22.5	37.4	78.6	125	192	258
12.0	6.93	11.1	24.9	41.5	87.1	139	212	286
15.0	8.66	12.5	28.2	46.9	98.6	157	240	324
20.0	11.6	14.7	33.1	55.1	116	184	282	381
25.0	14.4	16.6	37.5	62.3	131	209	319	432
30.0	17.3	18.3	41.5	68.9	145	231	353	478

Flow capacity is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.  
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-vacuum.

Consult Factory for flow capacity with fiberglass valve.

Read the flow capacity at 100% over-vacuum directly from the table above. Use linear interpolation if the set vacuum is not listed. (Ref: Page TPD1)

If the allowable over-vacuum is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-vacuum is more than 100%, consult page TPD1 or your Groth Representative.

Calculate the percentage over-vacuum by the following formula. Note that all pressures are gage pressure expressed in the same units of measure.

$$P_f = \text{Flowing pressure}$$

$$P_s = \text{Set pressure}$$

$$\%OV = [(P_f - P_s)/P_s] \times 100$$

Calculate flow capacity at less than 100% over-vacuum according to the following example.

#### Example—Flow Capacity Calculation

- 6" Model 1220A/7618
- 4 In WC set vacuum (P<sub>s</sub>)
- 7 In WC flowing vacuum (P<sub>f</sub>)

- Read flow capacity at set vacuum from table
- Calculate over-vacuum.
- Read "C" factor from table
- Calculate flow capacity

$$\text{Flow} = 46,700 \text{ SCFH}$$

$$\%OV = [(7 - 4)/4] \times 100 = 75\%$$

$$"C" = 0.87$$

$$\text{Flow} = 0.87 \times 46,700 = 40,629 \text{ SCFH}$$

#### Example—To find "C" factor from table:

Read "C" factor for 75% Over-vacuum at intersection of row 70 and column 5  
"C" factor at 75% OV = 0.87

"C" Factor Table										
%OV	0	1	2	3	4	5	6	7	8	9
10	Consult Factory									
20										
30										
40										
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.91	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00



SPECIFICATION TABLE • MODELS 7618 / 7628

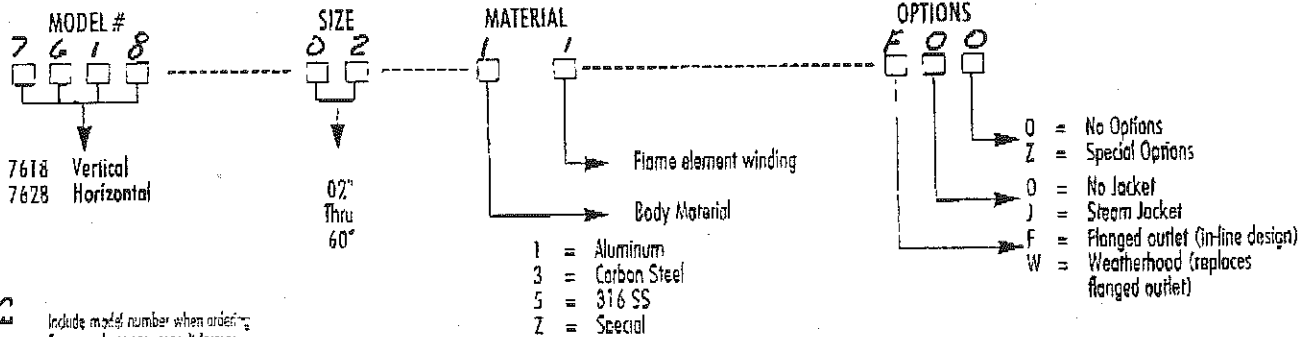
Specifications subject to change without notice. Certified dimensions available upon request.

Size <sup>1</sup>	A Width (Metric)	B Height (Metric)	AA Length (Metric)	BB Height (Metric)	MAWP 7618 Aluminum (Metric)	MAWP 7618 Carbon or SS (Metric)	MAWP 7628 Aluminum (Metric)	MAWP 7628 Carbon or SS (Metric)	Approx. Ship. Wt. Lbs. (Aluminum)
2" (51 mm)	8 1/2" (221)	14" (356)	13 1/2" (349)	9 1/2" (241)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	150 PSIG (1025 kPa)	350 PSIG (2415 kPa)	18 (8 kg)
3" (76 mm)	9 1/2" (241)	16" (406)	15 1/2" (393)	11" (279)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	25 (11 kg)
4" (102 mm)	11 1/2" (292)	18 1/2" (464)	18" (457)	12 1/2" (318)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	40 (18 kg)
6" (152 mm)	16 1/2" (419)	21" (533)	21" (533)	16 1/2" (419)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	140 PSIG (966 kPa)	325 PSIG (2242 kPa)	70 (32 kg)
8" (203 mm)	21" (533)	25" (635)	25" (635)	20 1/2" (521)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	90 PSIG (621 kPa)	200 PSIG (1380 kPa)	135 (61 kg)
10" (254 mm)	24 1/2" (629)	30" (762)	30" (762)	24 1/2" (622)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	75 PSIG (517 kPa)	150 PSIG (1035 kPa)	235 (107 kg)
12" (305 mm)	28 1/2" (727)	32 1/2" (826)	32 1/2" (826)	28 1/2" (724)	50 PSIG (345 kPa)	100 PSIG (693 kPa)	75 PSIG (517 kPa)	150 PSIG (1035 kPa)	345 (156 kg)

<sup>1</sup> Larger sizes available on special application. <sup>2</sup> 150# A.N.S.I. drilling compatibility, F.F. on aluminum and R.F. on carbon steel and stainless steel alloys.

### HOW TO ORDER

FOR EASY ORDERING, SELECT PROPER MODEL NUMBER



#### NOTES

Include model number when ordering.  
For special options, consult factory.  
When ordering steam jacket, include steam pressure/temperature.

#### EXAMPLE

7 6 2 8 - 0 2 - 1 5 - F 0 0

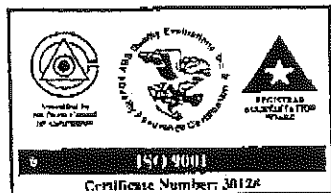
Indicates a 2" Model 7628 with Aluminum Body, 316 SS Flame Element Winding, Flanged Outlet and no other options.



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#### GROTH IS COMMITTED TO THE TOTAL QUALITY IMPROVEMENT PROCESS

1202 Hahlo • P.O. Box 15293  
Houston, Texas 77220-5293  
713/675-6151 FAX 713/675-6739  
Groth Products Group  
1-800-552-2960 (Except Tex. & La.)



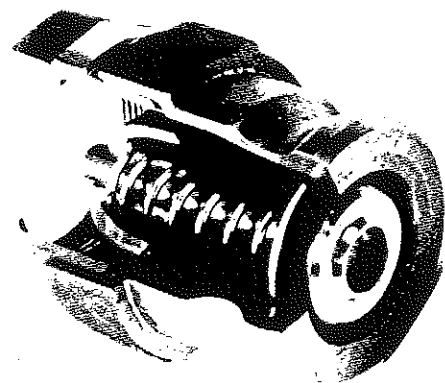
Form 10M952



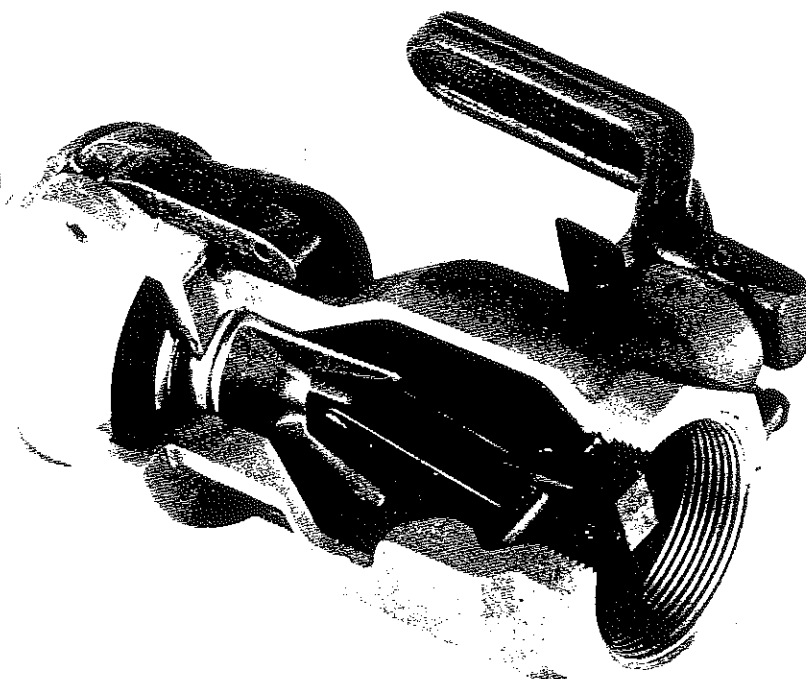
**SPATCO**

**284**

# **OPW<sup>®</sup> The Dry-Disconnect Experts Introduce the D-2000 Dry-Disconnect Coupling.**



OPW Kamvalok<sup>®</sup> Adaptor  
Model 1611 A



OPW D-2000 Coupler  
Model 2261 D

***If you want to avoid spillage, you need the OPW D-2000 Dry-Disconnect Cam and Groove Quick Coupling. The D-2000 helps prevent spillage from disconnect. Your product stays in the line – and off the floor.***

---

• *Easy-to-Clean Design*

---

• *Built-in Valve*

---

• *Low Cost Design*

---

• *Heavy Duty Construction*

---

---

• *Easy-to-Use Cam and Groove Design*

---

• *Compatible with Kamvalok<sup>®</sup> Adapters*

---

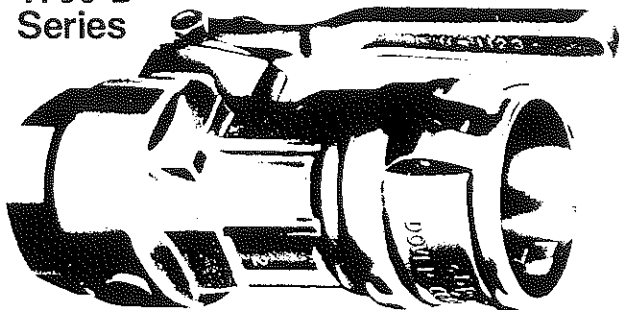
• *Simple Design for Reliable Operation*

---



# Styles

**1700-D\*  
Series**



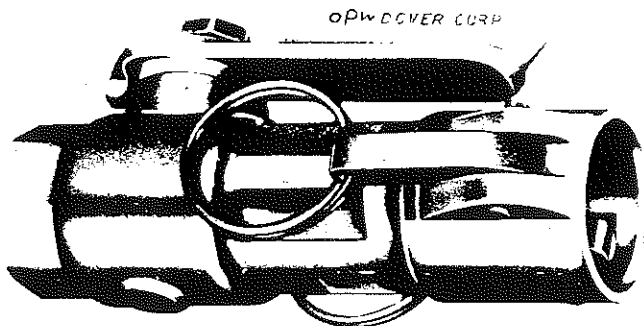
**1600-A\*  
Series**



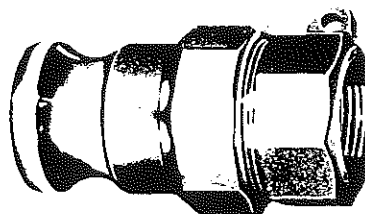
*The Kamvalok® coupler and adaptor are designed with female threads, and can be fitted to either a male pipe end or to a hose fitting.*

**SIZES: 1½", 2", 3"**

**1762-DP**



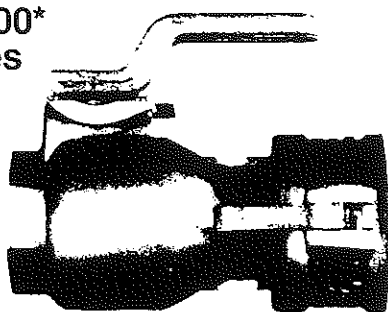
**1662-A**



*These special Kamvalok couplers and adaptors are used primarily for low flow applications.*

**SIZE: ¾"**

**D-2000\*  
Series**



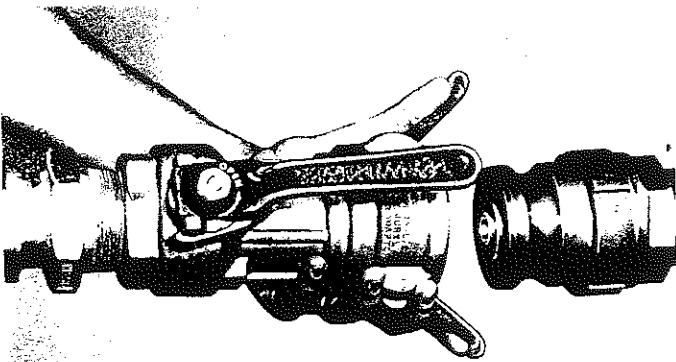
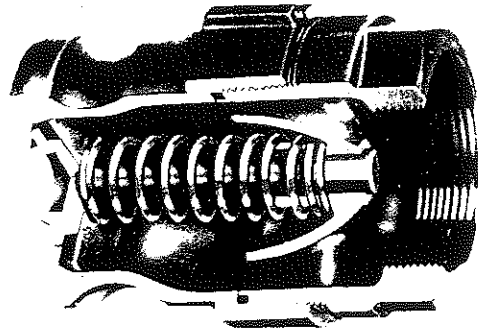
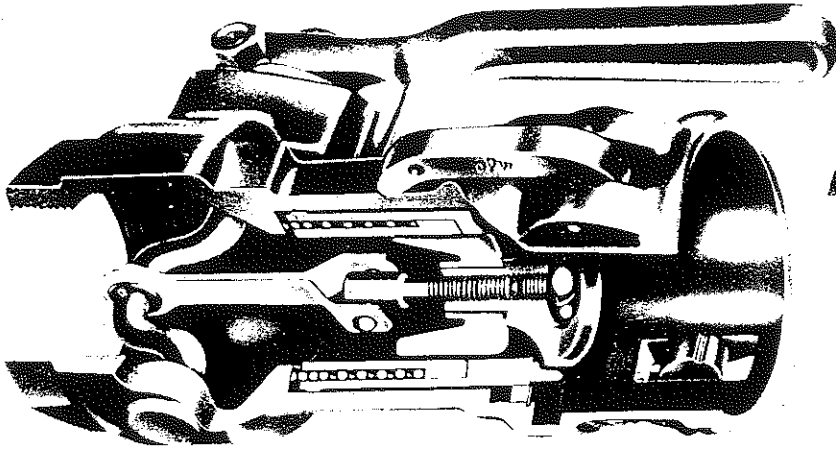
*The D-2000 coupler has been designed for applications requiring automatic closure in one direction, from adaptor side only.*

**SIZES: 1½", 2"**

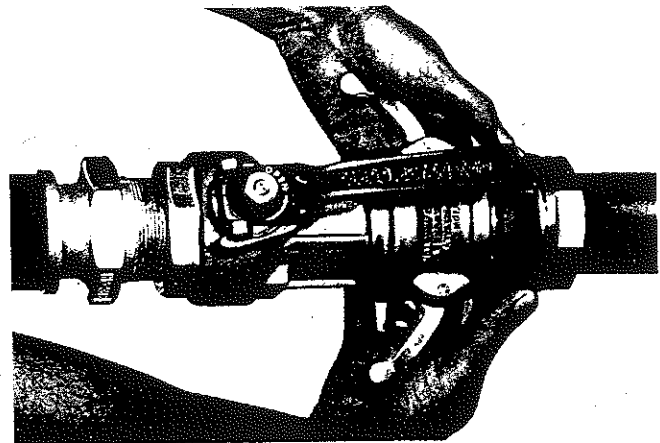
\* : For correct product number consult availability chart specifying metal and/or seal construction.



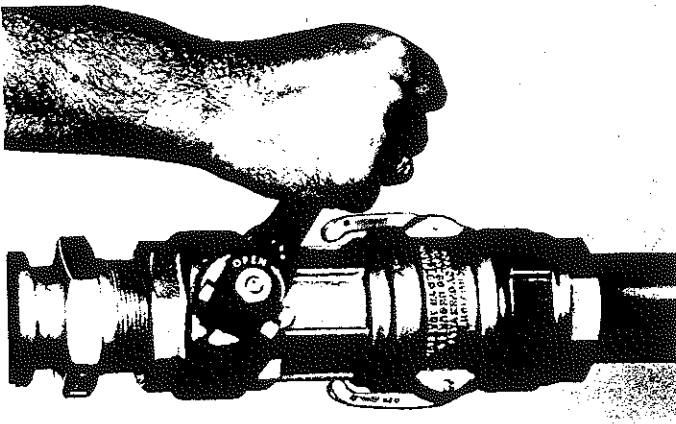
## Operation



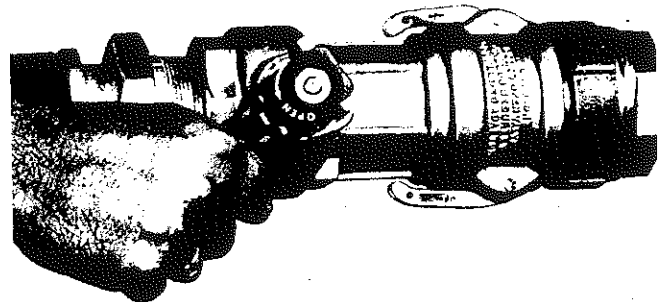
1. Couple in any position



2. Cam arms lock coupler and adaptor together



3. Lever opens valve



4. Full flow starts

**opw®**

**DOVER** FLUID HANDLING GROUP  
CORPORATION / OPW DIVISION



## REFRIGERATED COMPRESSED AIR DRYERS

PNEUMATICS

## THREE-IN-ONE COMPRESSED AIR DRYERS

- 3-in-1 design combines aftercooler, refrigerated dryer, and reheater in a single unit. Eliminates need for a separate aftercooler to precool the incoming air from compressor
- Handles inlet air temperature up to 100°F
- Produces 35°F pressure dewpoint. Removes 96% of harmful moisture from compressed air. Helps protect air system components, spray guns, air tools, sandblasters and other pneumatic equipment
- Single unit reduces installation, operating and maintenance cost
- Operates in hot environments (up to 100°F maximum ambient temperature)
- All copper spiral fin tube-in-tube heat exchanger provides maximum efficiency for heat transfer and water separation
- Heat exchanger warranted for 5 years
- Includes monitoring instrumentation, separator, and drain trap
- Standard 6 ft cord plugs into any 115V wall outlet (115V models only)
- Refrigeration systems utilize environmentally safe R-22 refrigerant

**SPEEDAIRE**

Made in the U.S.A.

Max. Air Compressor HP	CFM Capacity @ 35°F Pressure Dew Point	HP	Volts, 60 Hz	Inlet/ Outlet (F/NPT)	Dimensions			Stock No.	List	Each	Shpg Wt.
					H	W	D				
5	22	1/3	115	1"	21"	26"	16"	52656	\$1250.00	\$1157.00	110.0
10	37	1/2	115	1	26	30	20	52657	1575.00	1457.00	140.0
15	56	3/4	115	1	26	30	20	52658	2135.00	1975.00	170.0
25	91	1	230	1	31½	34½	27½	52659	3050.00	2822.00	235.0

## REFRIGERATED COMPRESSED AIR DRYERS

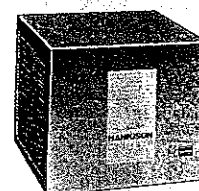
Hankison refrigerated dryers eliminate harmful moisture and provide high quality, clean, dry air.

- Consistent outlet dew points assure dry air downstream
- Built-in oil and dirt removal filter eliminates contaminants
- Large precool/reheaters allow use of smallest refrigeration systems possible, minimizing energy requirements
- Smooth surface heat exchangers permit low pressure drop through dryer
- Heat exchangers are fully encapsulated in non-degrading insulation to preserve cooling effect
- Efficient, direct expansion type heat exchangers respond quickly to changes in load
- Non-fouling, smooth surface, copper heat exchangers maintain high heat transfer efficiency for life of dryer, no prefilter required
- Accurate control of refrigeration temperature eliminates need for manual adjustments as load or ambient temperature changes
- Positive condensate discharge with compressed air powered automatic drain
- Two-stage separator maintains high efficiency separation across wide range of flows
- Refrigeration system service life maximized by continuous, non-cycling operation
- Refrigeration systems utilize environmentally safe R-134A or R-22 refrigerants

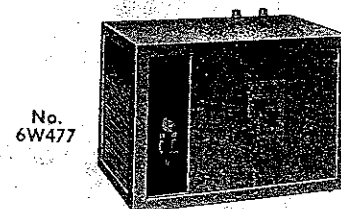
Nos. 6W474, 6W475, and 6W476 feature integral oil/dirt filter, power-on and high temperature warning lights, and six foot power cord with plug. Full cabinet includes removable end screens and wall mounting bracket.

Nos. 6W477 thru 6W482 have all features of No. 6W474. Also include on/off switch, refrigerant suction pressure gauge, and mounting feet instead of brackets.

Nos. 6W483 and 6W484 feature integral oil/dirt filter, and power-on, compressor, and high temperature warning lights. Full cabinet includes removable end screens and mounting feet. Also includes refrigerant suction pressure gauge.

**HANKISON INTERNATIONAL**

No. 6W475



No. 6W477

Max. Air Comp. HP	CFM Cap. @ Pressure Dew Pts. 38°F 50°F		Refrig. Comp. HP	Volts/ Phase 60 Hz	Inlet and Outlet	Overall Dimensions			Mfr's Model	Stock No.	List		Shpg Wt.
	H	W				D	Each						
1 1/4	5	7	1/10	115-1	3/8" OD	14"	16 1/2"	15"	PR5	6W474	\$507.00	\$459.50	50.0
1 1/2	10	13	1/6	115-1	3/8 OD	14	16 1/2"	15	PR10	6W475	577.00	521.50	57.0
2	15	20	1/5	115-1	3/8 OD	14	16 1/2"	15	PR15	6W476	712.00	644.50	65.0
2 1/2	25	33	1/5	115-1	3/4"	21	26	16	PR25	6W477	1010.00	898.00	117.0
3	35	46	1/5	115-1	3/4"	21	26	16	PR35	6W478	1265.00	1195.00	119.0
4	50	65	1/4	115-1	1"	25	34	22	PR50	6W479	1690.00	1520.00	203.0
5	75	98	1/3	115-1	1"	25	34	22	PR75	6W480	2100.00	2010.00	219.0
7 1/2	100	130	1/2	115-1	1 1/2"	25	34	22	PR100	6W481	2275.00	2170.00	236.0
10	125	163	3/4	115-1	1 1/2"	25	34	22	PR125	6W482	2625.00	2485.00	245.0
15	150	195	3/4	115-1	2"	36 3/8"	36 3/8"	40 1/2"	PR150	6W483	3250.00	3095.00	437.0
20	200	260	1	460-3	2"	36 3/8"	36 3/8"	40 1/2"	PR200	6W484	3900.00	3630.00	440.0

(\*) MOUNT

(") (NPT).

Dryer capacities at 38° and 50°F pressure dew point temperatures have been established with compressed air entering dryer at 100 psig and 100°F saturated with dryer operating in 100°F ambient temperature. Operating range: 35° to 110°F ambient. Maximum working pressure: 175 psig. Maximum inlet compressed air temperature: 120°F. If inlet temperatures exceed 120°F, precool air with air or water cooled aftercooler.

SEE WARRANTY INFORMATION ON PAGE OPPOSITE INSIDE BACK COVER

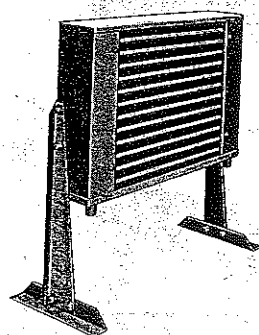


# PNEUMATICS

# AFTERCOOLERS

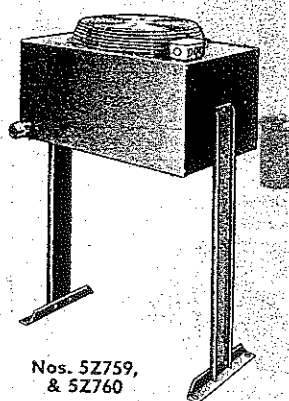
## AIR-COOLED AFTERCOOLERS

**SPEEDAIRE**

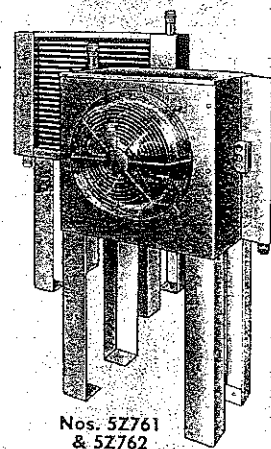


Nos. 5Z757,  
& 5Z758

Nos. 5Z757-5Z760 may be mounted for either vertical or horizontal discharge.



Nos. 5Z759,  
& 5Z760



Nos. 5Z761  
& 5Z762

Remove harmful water, oil, and contaminants from compressed air systems

- Precool hot air from compressor to temperatures required for use with compressed air dryers
- High efficiency copper tube/aluminum fin heat exchangers provide close approach temperatures with minimal power consumption
- Heavy-duty construction for long, trouble-free life
- Single point electrical junction box for ease of installation
- Includes brackets/legs for floor or suspended mounting

- Nos. 5Z759-5Z762 include ambient air filter to protect from airborne contaminants

- Guards conform to OSHA requirements
- Fan motors are UL recognized, CSA certified
- Steel cabinets have metallic green finish

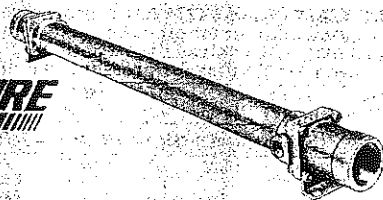
NOTE: Use of flexible metal hose between air compressor and aftercooler is recommended to prolong equipment life. Separator and drain required to remove condensed water and oil. See page 2007 for hose and page 1858 for separators and drains

Maximum Comp. HP	Max. CFM @ 100 PSI*	Fan HP	Volts, 60 Hz	Inlet/Outlet (F/NPT)	H	Dimensions W	D	Stock No.	List	Each	Shelf
5	20	1/12	115	1/2"	21 1/2"	20 3/4"	9 5/8"	5Z757	\$315.00	\$257.75	24 1/2"
10	35	1/12	115	1/2"	21 1/2"	20 3/4"	9 5/8"	5Z758	345.00	282.00	30 1/2"
15	50	1/12	115	1"	42 1/4"	26 1/4"	15 1/2"	5Z759	450.00	375.00	36 1/2"
25	100	1/12	115	1 1/2"	42 1/4"	26 1/4"	15 1/2"	5Z760	607.00	498.00	68 1/2"
35	150	1/4	115	1 1/2"	46 1/2"	43 1/2"	17 3/4"	5Z761	780.00	640.00	150 1/2"
50	240	1/4(2)	115	2"	49 1/2"	47 3/4"	17 3/4"	5Z762	1040.00	849.00	225 1/2"

(\*) Ratings based on 15°F approach with 250°F inlet temperature.

## WATER-COOLED AFTERCOOLERS

**SPEEDAIRE**



- Remove damaging water, oil, and contaminants from compressed air systems
- Highly efficient cooler is built with corrosion resistant copper tubes, brass shell and internal baffles
- Cast iron end bonnets are removable for servicing

For best performance, install aftercoolers so water flows in opposite direction to compressed air. 250 PSI maximum air pressure, 250 PSI maximum water pressure. 500°F maximum operating temperature. Mounting feet at both ends. Green metallic finish. Speedaire brand.

Maximum Comp. HP	Max. CFM @ 100 PSI*	Cooling Area Surface	NPT Inlet & Outlet Water	NPT Inlet & Outlet Air	L	Dimensions W	H	Stock No.	List	Each	Shelf
1	40	3.5 sq. ft.	1/2"	1"	23 1/4"	3 1/4"	3 1/4"	5Z625	\$203.00	\$170.75	14 1/2"
1	110	5.0	1/2"	1 1/2"	36 3/4"	3 3/4"	3 3/4"	5Z626	229.50	192.00	15 1/2"
1	300	18.6	1"	2 1/2"	50 1/4"	5 1/4"	6 1/4"	5Z627	448.00	367.25	44 1/2"

\* Inlet compressed air to 15°F above inlet water temperature.

# REFRIGERATION

3-in-1 design combines air refrigerated dryer, and reheater unit. Eliminates need for aftercooler to precool the air from compressor

Handles inlet air temperature 180°F

Produces 35°F pressure dew point. Removes 96% of harmful moisture from compressed air. Helps protect components, spray guns, sandblasters and other equipment

Single unit reduces installation and maintenance cost

Max. Air Comp. HP	CFM Capacity @ 35°F Pressure Dew Point	HP	Volts 60 Hz
5	22	1/3	1
10	37	1/2	1
15	56	3/4	1
25	91	1	2

# RE

Refrigerated dryers remove harmful moisture and provide clean, dry air.

Consistent outlet dew points downstream

Light oil and dirt removal filters contaminants

Precooler/reheaters allow smallest refrigeration systems minimizing energy requirement

Smooth surface heat exchanger pressure drop through dryers

Heat exchangers are fully enclosed non-degrading insulation to cooling effect

Efficient, direct expansion type dryers respond quickly to changes

Smoothing, smooth surface, heat exchangers maintain high efficiency for life of cooler filter required

Accurate control of refrigeration temperature eliminates need for maintenance as load or ambient temperature changes.

Max. Air Comp. HP	CFM Cap. @ 35°F Pressure Dew Pts.	Refrig. Comp. HP	Volts/Phase 60 Hz	Inlet and Outlet
10	7	1/10	115-1	3/8" O
15	13	1/6	115-1	3/8" O
25	20	1/5	115-1	3/8" O
35	33	1/5	115-1	3/4"
50	46	1/5	115-1	3/4"
75	65	1/4	115-1	1"
100	98	1/3	115-1	1"
125	130	1/2	115-1	1 1/2"
150	163	3/4	115-1	1 1/2"
200	260	1	115-1	2"
250	360	1	460-3	2"

SEE WARRANT



## 5 TO 25 HP TWO-STAGE AIR COMPRESSOR

CHAMPION DESIGN

- For auto repair, body shops, air tool operation, and automated machinery
- All models comply with State of California Code 462 (L) (2)
- Green finish

**SPLASH LUBRICATED PUMPS**

- Multifinned aluminum cylinder with cast iron liner combines inner strength of high density cast iron with cooling efficiency of an aluminum exterior
- 15 and 25 HP models have dual control for stop/start or continuous run operation, cast iron cylinders and heads, and an oil monitor which prevents unit from starting if proper oil level is not maintained
- Rugged, ductile iron crankshaft is counterbalanced with large diameter throws for low bearing loads
- Maximum cooling with precision balanced, fan-bladed flywheel
- Swedish steel, single-unit, plate-type valves are easy-to-service; cylinder does not need to be removed
- High density, die-cast aluminum alloy connecting rods minimize reciprocating weight
- Gasket-free integral cylinder head
- Aluminum alloy first stage piston is weight matched to second stage piston ensuring reciprocating balance
- Positive acting, governor-type, centrifugal unloader assures unloaded starts
- Unit shipped with oil in crankcase

## MOTOR FEATURES

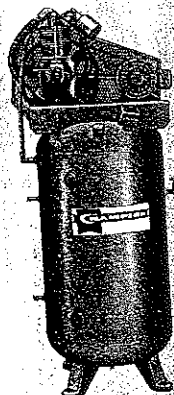
- Dual voltage NEMA motors

## ENGINE FEATURES

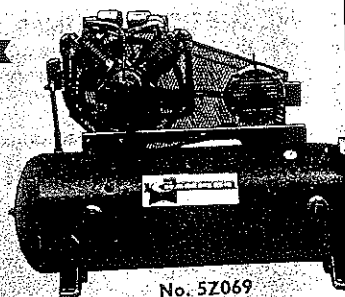
- 10 HP Kohler Magnum engine with electronic ignition
- Large capacity dual element air cleaner

## TANK MOUNT FEATURES

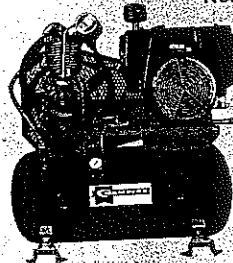
- ASME tank and safety valve. Includes bucket high drain valve, 300 PSI pressure gauge, and tank shutoff valve



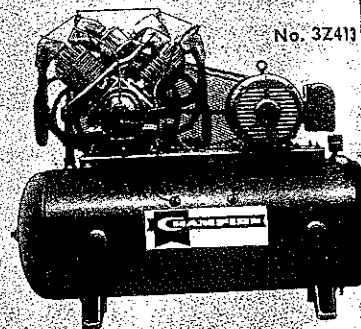
No. 52064



No. 5Z069



No. 5Z068



No. 3Z413

**CHAMPION PNEUMATIC 5-YEAR  
LIMITED WARRANTY**

**LIMITED WARRANTY**  
Champion Pneumatic warrants compressors for 5 years. Text of warranty available on request. See "Manufacturers' Warranties" on page opposite inside back cover.

## COMPRESSOR SPECIFICATIONS

COMPRESSOR SPECIFICATIONS								
HP	Stock No.	RPM	Pump Cyls	Bore	Stroke	Oil Cap.	(M)NPT Outlet	Dimensions L" W"
5	5Z064	710	2	4 5/8"	3	2 qt	3/4"	32"
	4 5/8"			60				
	2 1/2"			20				
	2 1/2"			32				
	2 1/2"			60				
	5Z067							20
	5Z068							26
10	5Z069	765	4	4 3/8"	3	4	3/4"	72
10	5Z068	710	2	2 1/2"	3	2	3/4"	41
15	3Z412	770	2	6 1/4"	4 1/2"	4	1 1/4"	76
25	3Z413	770	4	6 1/4"	4	6 1/2"	1 1/4"	35

## ELECTRIC MODELS

ELECTRIC MODELS										With Magnetic Starter*			
HP Phase	Voltage, 60 Hz	Gallons	Tank Type	Displ CFM @ 175 PSI	Champion Model	Stock No.	List	Each	Shpg. Wt.	Volts, 60 Hz	Stock No.	List	Each
5 1	230	80	Vertical	20.7 16.5	VR5-8	5Z064	\$2873.00	\$1704.00	540.0	230	7Z446	\$3064.15	\$1839.00
5 1	230	80	Horizontal	20.7 16.5	HR5-8	5Z065	2873.00	1704.00	540.0	230	7Z447	3064.15	1839.00
5 3	230/460	80	Vertical	20.7 16.5	VR5-8	5Z066	2722.00	1602.00	540.0	230 460	7Z448 7Z449	2908.35 2906.35	1746.00 1744.00
5 3	230/460	80	Horizontal	20.7 16.5	HR5-8	5Z067	2722.00	1602.00	540.0	230 460	7Z450 7Z451	2908.35 2906.35	1746.00 1744.00
10 3	230/460	120	Horizontal	44.6 34.4	HR10-12	5Z069	4957.00	2882.00	890.0	230 460	7Z452 7Z453	5115.05 5040.23	3070.00 3025.00
15 3	230/460	120	Horizontal	61.5 53.7	HRA15-12	3Z412	6415.00	4065.00	1144.0	230 460	7Z454 7Z455	7142.22 7038.00	4276.00 4223.00
25 3	230/460	120	Horizontal	109.4 91.0	HRA25-12	3Z413	8467.00	5361.00	1350.0	230 460	7Z456 7Z457	9584.60 9295.60	5751.00 5578.00

GAS MODEL (KOHLER MAGNUM ENGINE)

GAS MODEL (KOHLEK MAGNET)							
10	—	30	Horizontal	20.7	16.5	HGR5-3 5Z068 3204.00	1917.00 400.0

(\*) Magnetic starters are not mounted and wired; provided separately.

**WHOLESALE PRICES—GRAINGER**

1836

for normal conditions, factory compressors may require selection of a larger unit to provide for the future. The air requirement for all of the air required to open is not available. To estimate guide. To variables and pressure pressure recording device or must operate

## AIR RE

use free air (Cl  
specifications fro  
ice, or from t.

## INDUS

## PSI Range

to 3/8"  
to 5/16"  
ver, #2 to #6 S  
ver, #6 to 5/16"  
to 3/8"  
to 3/8"  
to 3/4"  
French, 1/4"  
French, 3/8"  
French, 1/2"  
French, 3/4"  
French, 1 1/4"  
der, Small  
der, Medium  
der, Grinder, 2"  
der, Grinder, 4"  
der, Grinder, 6"  
der, Grinder, 8"  
Grinders and S  
Grinders and S  
Grinders and S

# AUTOM BASED

## Portable Tools

Air Filter Cl  
Body Polish  
Body Sande  
Brake Teste  
Carbon Rem  
Dusting Blow  
Drill, 1/16" to  
Impact Wren  
3/8" square  
Impact Wren  
1/2" square  
Impact Wren  
3/4" square  
Impact Wren  
1" square  
Die Grinder  
Vertical Dis  
Filing/Sawin  
Small  
Filing/Sawin  
Large

8000 lbs. capaci

**SEE**

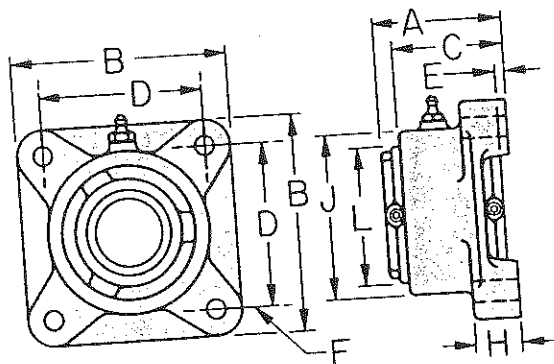
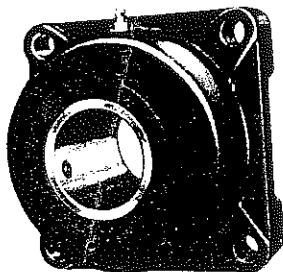


# HUB CITY BEARING UNITS

## Tapered Roller Bearing Flange Blocks

Type E

### NON-EXPANSION TYPE



#### MODEL EFB4

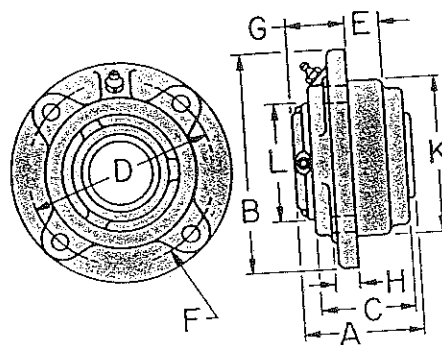
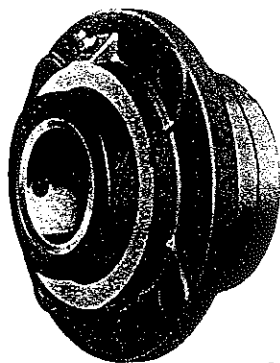
Shaft Size	DIMENSIONS									Wt. Lbs.
	A	B	C	D	E	F Bolt	H	J	L	
1 1/16, 1 1/8	2 1/16	3 3/4	2 1/32	2 7/8	1/16	3/8	1	2 1/16	2 1/4	4.4
1 3/8, 1 1/16	3 1/16	4 3/8	2 1/32	3 1/2	1/16	1/2	1 1/16	3 1/2	2 3/4	6.8
1 1/2, 1 3/8, 1 1/8	3 1/2	5 3/8	2 3/32	4 1/8	1/8	1/2	1 3/16	4 3/8	3 3/16	11.1
1 3/4, 1 1/2, 1 1/8, 2	3 3/8	5 3/4	3 3/32	4 3/8	1/8	5/8	1 3/8	4 7/8	3 3/4	11.7
2 1/16	3 3/8	6 3/4	3 3/32	4 7/8	1/8	5/8	1 3/8	4 7/8	3 3/4	15.5
2 1/4, 2 1/16, 2 1/2	4 3/16	6 7/8	3 1/16	5 3/8	3/16	3/4	1 1/2	5 1/8	4 1/16	20.6
2 1/8, 2 1/4, 2 1/16, 3	4 1/16	7 3/4	3 1/16	6	3/16	3/4	1 3/8	6	4 2/32	26.9
3 1/16, 3 1/4, 3 1/8, 3 1/2	5 1/4	9 1/4	4 1/4	7	1/4	7/8	1 7/8	7 1/4	5 1/16	51.3
3 1/8, 4	6 1/2	10 1/4	5 3/8	7 3/4	1/4	7/8	2 1/8	8 1/4	5 1/16	75.1

† Assembled to order. Consult factory for delivery.

## Tapered Roller Bearing Flange Cartridges

Type E

### NON-EXPANSION TYPE



#### MODELS EFC4 AND EFC6

MODELS EFC4 AND EFC6											Wt. Lbs.
Shaft Size	DIMENSIONS										
	A	B	C	D	E	F Bolt □	G	H	K +.000 -.002	L	
1 <sup>1</sup> / <sub>16</sub> , 1 <sup>1</sup> / <sub>8</sub> 1 <sup>3</sup> / <sub>8</sub> , 1 <sup>1</sup> / <sub>2</sub> 1 <sup>1</sup> / <sub>2</sub> , 1 <sup>3</sup> / <sub>8</sub> , 1 <sup>1</sup> / <sub>16</sub> 1 <sup>3</sup> / <sub>4</sub> , 1 <sup>1</sup> / <sub>2</sub> , 1 <sup>1</sup> / <sub>16</sub> , 2 2 <sup>1</sup> / <sub>16</sub>	2 <sup>3</sup> / <sub>4</sub>	5	2 <sup>7</sup> / <sub>32</sub>	4 <sup>1</sup> / <sub>8</sub>	<sup>3</sup> / <sub>4</sub>	<sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	3 <sup>3</sup> / <sub>8</sub>	2 <sup>1</sup> / <sub>4</sub>	5.1
	3	5 <sup>1</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>32</sub>	4 <sup>3</sup> / <sub>8</sub>	<sup>7</sup> / <sub>8</sub>	<sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	<sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	2 <sup>3</sup> / <sub>4</sub>	6.4
	3 <sup>3</sup> / <sub>8</sub>	6 <sup>3</sup> / <sub>8</sub>	2 <sup>25</sup> / <sub>32</sub>	5 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>8</sub>	<sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>4</sub>	3 <sup>3</sup> / <sub>16</sub>	9.4
	3 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>8</sub>	2 <sup>25</sup> / <sub>32</sub>	5 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>7</sup> / <sub>16</sub>	1 <sup>3</sup> / <sub>8</sub>	<sup>9</sup> / <sub>16</sub>	4 <sup>1</sup> / <sub>2</sub>	3 <sup>3</sup> / <sub>8</sub>	10.6
	3 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>32</sub>	6	1 <sup>1</sup> / <sub>16</sub>	<sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>9</sup> / <sub>16</sub>	5	3 <sup>3</sup> / <sub>4</sub>	13.6
2 <sup>1</sup> / <sub>4</sub> , 2 <sup>1</sup> / <sub>16</sub> , 2 <sup>1</sup> / <sub>2</sub> 2 <sup>1</sup> / <sub>16</sub> , 2 <sup>3</sup> / <sub>4</sub> , 2 <sup>1</sup> / <sub>16</sub> , 3 3 <sup>3</sup> / <sub>16</sub> †, 3 <sup>1</sup> / <sub>4</sub> †, 3 <sup>3</sup> / <sub>8</sub> , 3 <sup>1</sup> / <sub>2</sub> † 3 <sup>1</sup> / <sub>16</sub> , 4† 4 <sup>1</sup> / <sub>16</sub> , 4 <sup>1</sup> / <sub>2</sub> † 4 <sup>1</sup> / <sub>8</sub> , 5†	4	7 <sup>3</sup> / <sub>8</sub>	3 <sup>3</sup> / <sub>16</sub>	6 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>8</sub>	<sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>16</sub>	<sup>5</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>2</sub>	4 <sup>1</sup> / <sub>16</sub>	17.3
	4 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	3 <sup>1</sup> / <sub>16</sub>	7 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>4</sub>	2	<sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>8</sub>	4 <sup>23</sup> / <sub>32</sub>	25.8
	5	10 <sup>1</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>16</sub>	8 <sup>3</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>4</sub>	<sup>3</sup> / <sub>4</sub>	2 <sup>7</sup> / <sub>16</sub>	<sup>7</sup> / <sub>8</sub>	7 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>16</sub>	42.8
	6 <sup>1</sup> / <sub>4</sub>	10 <sup>3</sup> / <sub>4</sub>	4 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>8</sub>	1 <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>4</sub>	2 <sup>1</sup> / <sub>16</sub>	<sup>13</sup> / <sub>16</sub>	8 <sup>3</sup> / <sub>8</sub>	5 <sup>1</sup> / <sub>8</sub>	57.4
	6 <sup>3</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>2</sub>	4 <sup>3</sup> / <sub>8</sub>	11 <sup>1</sup> / <sub>4</sub>	1 <sup>1</sup> / <sub>2</sub>	<sup>3</sup> / <sub>4</sub> †	3 <sup>1</sup> / <sub>32</sub>	1	10 <sup>1</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>16</sub>	92.5
7 <sup>1</sup> / <sub>4</sub>	14 <sup>3</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>16</sub>	12 <sup>3</sup> / <sub>4</sub>	1 <sup>3</sup> / <sub>4</sub>	<sup>7</sup> / <sub>8</sub> †	2 <sup>3</sup> / <sub>32</sub>	1 <sup>1</sup> / <sub>4</sub>	11	7 <sup>1</sup> / <sub>2</sub>	122	

Note: Sizes 1<sup>1</sup>/<sub>16</sub>-3<sup>1</sup>/<sub>2</sub> use single locking collar as shown in drawing.

† Assembled to order. Consult factory for delivery.

□ 4 equally spaced unless otherwise noted.

‡ 6 equally spaced.

Note: Sizes 1 1/16-3 1/2 use single locking collar as shown in drawing.



## HUB CITY BEARING UNITS

**Heavy Service** — For heavy shock loads, frequent shock loads, or severe vibrations, add up to 50% (according to severity of conditions) to the Equivalent Radial Load to obtain a Modified Equivalent Radial Load. Consult customer service for additional selection assistance.

Select a bearing from the rating table having a radial load rating at the operating speed equal to or greater than the calculated "Equivalent Radial Load" for a desired L10 Life. This simple method is all that is required for the majority of general machine applications and provides for occasional average shock loads.

To determine the L10 Hours Life for loads and speeds not listed, use the following equation:

$$L_{10} = \left( \frac{C_{90}}{P} \right)^{10/3} \times \frac{1,500,000}{RPM}$$

Where:  $C_{90}$  = Dynamic Capacity (Table 1)  
 $P$  = Equivalent Radial Load, lbs.

When the load on a two row roller bearing is solely a radial load with no thrust load, the load is shared equally by both rows of rollers and the equivalent radial load ( $P$ ) is equal to the actual radial load. However, when a thrust load is applied, the loading on the two rows is shared unequally depending on the ratio of thrust to radial load. The use of the  $X$  (radial factor) and  $Y$  (thrust factor) from Table 1 convert the actual applied loads to an equivalent radial

load having the same affect on the life of a bearing as a radial load of this magnitude.

The equivalent radial load  $P = X Fr + Y Fa$

If calculated value of  $P$  is less than  $Fr$ , then use  $P = Fr$

Where  $P$  = Equivalent radial load, lbs.

$Fr$  = Radial Load, lbs.

$Fa$  = Thrust (axial) load, lbs.

$e$  = Thrust load to radial load factor (Table 1 below)

$X$  = Radial load factor (Table 1 below)

$Y$  = Thrust load factor (Table 1 below)

To find  $X$  and  $Y$ , first calculate  $Fa/Fr$  and compare to  $e$ . Determine  $X$  and  $Y$  from Table 1: Light thrust if  $Fa/Fr$  is less than or equal to  $e$  or heavy thrust if  $Fa/Fr$  is greater than  $e$ .

Substitute all known values into the equivalent radial load equation.  $P$  (equivalent radial load) thus determined can be used in life formula to determine L10 or compared to allowable equivalent radial load ratings for the speed and hours life desired in rating table.

**L10 Hours Life** — Is the life which may be expected from at least 90% of a given group of bearings operating under identical conditions.

TABLE 1

Shaft Size	e	Light Thrust If		Heavy Thrust If		Dynamic Capacity C90		Maximum RPM	Maximum Slit Fit Radial Load Fr
		Fa/Fr ≤ e		Fa/Fr > e					
		X	Y	X	Y	Lbs	Newtons		
1⅛-1¼	.49	.87	1.77	.70	2.14	2,980	13,260	4,490	5,600
1⅝-1⅞	.46	.87	1.89	.70	2.28	4,760	21,180	3,820	5,600
1½-1⅞	.44	.87	1.96	.70	2.37	6,140	27,320	3,320	5,600
1¾-2	.33	.87	2.64	.70	3.18	8,070	35,908	3,050	8,210
2⅜	.36	.87	2.38	.70	2.87	8,550	38,044	2,730	8,210
2¼-2½	.40	.87	2.17	.70	2.63	9,090	40,447	2,420	8,210
2⅞-3	.46	.87	1.87	.70	2.26	9,600	42,716	2,060	13,800
3⅝-3½	.50	.87	1.71	.70	2.07	15,300	68,078	1,640	13,800
3⅞-4	.49	.87	1.77	.70	2.14	21,000	93,440	1,530	22,000
4⅞-4½	.53	.87	1.63	.70	1.97	25,800	114,799	1,360	32,500
4⅞-5	.47	.87	1.83	.70	2.21	35,500	157,959	1,200	32,500
5⅞-6	.49	.87	1.76	.70	2.12	40,700	181,097	915	53,000
6⅞-7	.54	.87	1.61	.70	1.95	69,200	307,910	790	100,000

\*  $C_{90}$  — Dynamic capacity based on a rated life of 90 million revolutions or 3,000 hours at 500 RPM.

\*\*If load exceeds maximum allowable slip fit radial load, snug to light press fit of shaft is required.

## COMPARING SPHERICAL TO TAPER ROLLER BEARING

The dynamic capacity  $C$  (spherical) and  $C_{90}$  (taper) are not to the same base. To compare basic dynamic capacities, multiply  $C \times .259$  and compare to  $C_{90}$ . To select and then compare, use the complete selection procedure for each type bearing and then compare.



# HUB CITY BEARING UNITS

## Table E Tapered Roller Bearing Units — Ratings

Shaft Size	L10 Life Hours	Allowable Equivalent Radial Load Rating (Lbs.) at Various Revolutions Per Minute															
		10	25	50	100	150	250	500	750	1000	1250	1500	1750	2000	2500	3000	3500
1 $\frac{1}{16}$ 1 $\frac{1}{8}$	5,000	8270	6280	5100	4145	3670	3145	2555	2265	2075	1940	1840	1755	1685	1575	1495	1425
	10,000	6720	5100	4145	3365	2980	2555	2075	1840	1685	1575	1495	1425	1370	1280	1215	1160
	30,000	4830	3670	2980	2420	2145	1840	1495	1320	1215	1135	1075	1025	985	920	870	835
	50,000	4140	3150	2555	2075	1840	1575	1280	1135	1040	975	920	880	845	790	750	715
	100,000	3360	2550	2075	1685	1495	1280	1040	920	845	790	750	715	685	640	610	580
1 $\frac{1}{8}$ 1 $\frac{1}{4}$	5,000	13210	10030	8150	6620	5860	5025	4085	3615	3315	3100	2935	2805	2695	2520	2385	2275
	10,000	10730	8150	6620	5375	4760	4085	3315	2935	2695	2520	2385	2275	2190	2045	1935	1850
	30,000	7710	5860	4760	3865	3425	2935	2385	2110	1935	1810	1715	1640	1575	1470	1395	1330
	50,000	6620	5030	4085	3315	2935	2520	2045	1810	1660	1555	1470	1405	1350	1260	1195	1140
	100,000	5370	4080	3315	2695	2385	2045	1660	1470	1350	1260	1195	1140	1095	1025	970	925
1 $\frac{1}{4}$ 1 $\frac{3}{8}$ 1 $\frac{1}{2}$	5,000	17030	12940	10510	8535	7560	6485	5265	4665	4280	4000	3790	3615	3475	3250	3075	
	10,000	13830	10510	8535	6935	6140	5265	4280	3790	3475	3250	3075	2940	2820	2640	2500	
	30,000	9950	7560	6140	4985	4415	3790	3075	2725	2500	2335	2215	2115	2030	1900	1795	
	50,000	8530	6480	5265	4280	3790	3250	2640	2335	2145	2005	1900	1810	1740	1630	1540	
	100,000	6940	5270	4280	3475	3075	2640	2145	1900	1740	1630	1540	1470	1415	1325	1250	
1 $\frac{3}{8}$ 1 $\frac{1}{2}$ 1 $\frac{5}{8}$ 2	5,000	22390	17010	13815	11220	9935	8525	6925	6130	5625	5260	4980	4755	4565	4270	4045	
	10,000	18180	13810	11220	9115	8070	6925	5625	4980	4565	4270	4045	3860	3710	3470	3285	
	30,000	13080	9940	8070	6555	5805	4980	4045	3580	3285	3070	2910	2775	2670	2495	2360	
	50,000	11220	8530	6925	5625	4980	4270	3470	3070	2820	2635	2495	2380	2290	2140	2025	
	100,000	9120	6930	5625	4565	4045	3470	2820	2495	2290	2140	2025	1935	1860	1740	1645	
2 $\frac{1}{8}$	5,000	23720	18020	14635	11885	10525	9030	7335	6495	5960	5570	5275	5035	4840	4525		
	10,000	19260	14630	11885	9655	8550	7335	5960	5275	4840	4525	4285	4090	3930	3675		
	30,000	13860	10530	8550	6945	6150	5275	4285	3795	3480	3255	3080	2940	2825	2656		
	50,000	11890	9030	7335	5960	5275	4525	3675	3255	2985	2790	2645	2525	2425	2270		
	100,000	9660	7340	5960	4840	4285	3675	2985	2645	2425	2270	2145	2050	1970	1840		
2 $\frac{1}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$	5,000	25220	19160	15560	12640	11190	9600	7800	6905	6335	5925	5610	5355	5145	4810		
	10,000	20490	15560	12640	10265	9090	7800	6335	5610	5145	4810	4555	4350	4180	3910		
	30,000	14730	11190	9090	7385	6535	5610	4555	4035	3700	3460	3275	3130	3005	2810		
	50,000	12640	9600	7800	6335	5610	4810	3910	3460	3175	2970	2810	2685	2580	2410		
	100,000	10270	7800	6335	5145	4555	3910	3175	2810	2580	2410	2285	2180	2095	1960		
2 $\frac{3}{8}$ 2 $\frac{1}{2}$ 2 $\frac{5}{8}$ 3	5,000	26630	20230	16430	13345	11820	10140	8235	7290	6690	6255	5925	5655	5435			
	10,000	21630	16430	13345	10840	9600	8235	6690	5925	5435	5080	4810	4595	4415			
	30,000	15580	11820	9600	7795	6905	5925	4810	4260	3910	3655	3460	3305	3175			
	50,000	13350	10140	8235	6690	5925	5080	4125	3655	3350	3135	2970	2835	2725			
	100,000	10840	8240	6690	5435	4810	4125	3350	2970	2725	2545	2410	2300	2210			
3 $\frac{1}{8}$ 3 $\frac{1}{2}$ 3 $\frac{3}{4}$ 3 $\frac{1}{2}$	5,000	42440	32240	26190	21270	18835	16160	13125	11620	10660	9970	9440					
	10,000	34470	26190	21270	17280	15300	13125	10660	9440	8660	8100	7670					
	30,000	24800	18840	15300	12425	11005	9440	7670	6790	6230	5825	5515					
	50,000	21270	16160	13125	10660	9440	8100	6580	5825	5345	4995	4730					
	100,000	17280	13120	10660	8660	7670	6580	5345	4730	4340	4060	3845					
3 $\frac{1}{2}$ 4	5,000	58250	44250	35945	29200	25855	22180	18015	15950	14635	13685	12955					
	10,000	47320	35950	29200	23715	21000	18015	14635	12955	11885	11115	10525					
	30,000	34030	25850	21000	17055	15105	12955	10525	9320	8550	7995	7570					
	50,000	29200	22180	18015	14635	12955	11115	9030	7995	7335	6860	6495					
	100,000	23720	18020	14635	11885	10525	9030	7335	6495	5955	5570	5275					
4 $\frac{1}{8}$ 4 $\frac{1}{2}$	5,000	71580	54370	44165	35870	31765	27250	22135	19600	17980							
	10,000	58130	44160	35870	29135	25800	22135	17980	15920	14605							
	30,000	41810	31760	25800	20955	18555	15920	12930	11450	10500							
	50,000	35870	27250	22135	17980	15920	13655	11095	9820	9010							
	100,000	29140	22140	17980	14605	12930	11095	9010	7980	7320							
4 $\frac{1}{2}$ 5	5,000	98480	74810	60765	49360	43705	37495	30455	26965	24740							
	10,000	80000	60770	49360	40090	35500	30455	24740	21905	20095							
	30,000	57530	43710	35500	28835	25530	21905	17790	15755	14450							
	50,000	49360	37490	30455	24740	21905	18790	15265	13515	12400							
	100,000	40100	30460	24740	20095	17790	15265	12400	10980	10070							
5 $\frac{1}{8}$ 5 $\frac{1}{2}$ 6	5,000	112910	85770	69670	56590	50105	42990	34915	30920								
	10,000	91710	69670	56590	45965	40700	34915	28360	25115								
	30,000	65960	50110	40700	33060	29270	25115	20400	18060								
	50,000	56590	42990	34915	28360	25115	21545	17500	15495								
	100,000	45960	34920	28360	23035	20400	17500	14215	12585								
6 $\frac{1}{8}$ 6 $\frac{1}{2}$ 6 $\frac{3}{4}$ 7	5,000	191970	145840	118455	96215	85195	73090	59365	52570								
	10,000	155930	118450	96215	78150	69200	59365	48220	42700								
	30,000	112150	85200	69200	56205	49770	42700	34680	30710								
	50,000	96210	73090	59365	48220	42700	36630	29755	25345								
	100,000	78150	59370	48220	39170	34680	29755	24170	21400								

Note: Ratings shown are ratings of the bearing only. Maximum radial or thrust load may be limited by housing strength or other components. Refer to pages K-40 through K-42. Refer to Table 1, page K-42, for maximum RPM and maximum slip fit radial load.



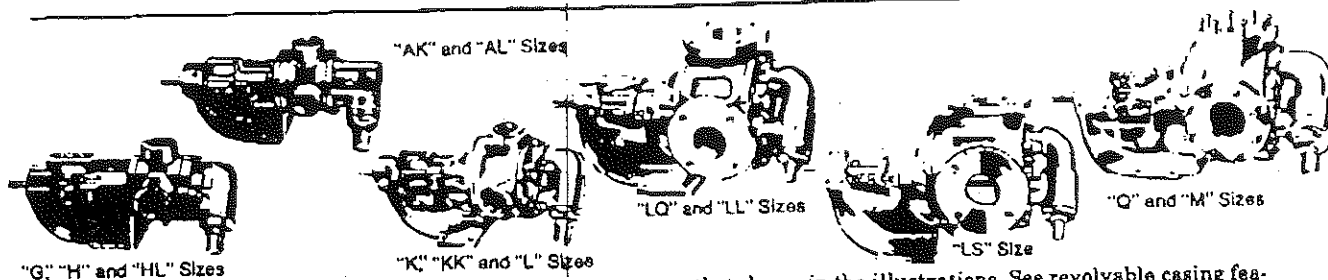
# SPATCO

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## VIKING® HEAVY-DUTY PUMPS

### SERIES 125 AND 4125

#### UNMOUNTED PUMPS



"G", "H" and "HL" Sizes

"K", "KK" and "L" Sizes

"LO" and "LL" Sizes

"LS" Size

"Q" and "M" Sizes

This series of heavy-duty pumps is available either unmounted or mounted units as shown on following pages. Available with Multi-Ring stuffing box or Buna-N mechanical seal with carbon rotating and Ni-Rosier stationary faces. The integral thrust bearing is designed to handle heavy-duty pumping jobs without problems of end play and distortion. For increased versatility of installation and complete selection of ports, the pump casing is designed so it can be rotated on the bracket to any 45° or 90° angle from

that shown in the illustrations. See revolvable casing feature on Page 141.3. Pressure relief valve on head is standard for this series. To permit use of this type pump in a greater range of applications, some sizes are available with jacketed head plate. For heavy-duty pumps with jacketed bracket and head, see Catalog Section 142.

Dimensions for Unmounted Pumps—See Page 141.11.  
Performance Data for Unmounted Pumps—See Pages 141.17 through 141.42.

#### CONSTRUCTION—SERIES 125 AND 4125 ("G" THROUGH "M" SIZES)

CONSTRUCTION—SERIES 125 AND 4125 ("G" THROUGH "M" SIZES)											
Pump Construction	Casing	Head	Bracket	Rotor	Idler	Rotor Shaft and Idler Pin	Bushings				Internal Relief Valve
							Packed		Mech. Seal		
							Idler	Bracket	Idler	Bracket	
Overhead Construction	Iron	Iron	Iron	⊙ Steel	Iron	Steel	Bronze	Bronze	Carbon Graphite	⊙ Bronze	Iron
2" Steel Fitted	Iron	Iron	Iron	⊙ Steel	Iron	Steel	Bronze	Bronze	Carbon Graphite	⊙ Bronze	Iron
4" Bronze Fitted	Iron	Iron	Iron	⊙ Bronze	Bronze	Steel	Bronze	Bronze	Carbon Graphite	⊙ Bronze	Iron

#### SPECIFICATIONS—SERIES 125 AND 4125 UNMOUNTED PUMPS

Model Number	Port Size	Nominal Pump Rating	Motor HP Required At Rated Speed Pumping 100 SSU Liquid		Maximum Hydro-Static Pressure	Steel Fitted Construction Recommended Above This Viscosity	Discharge Pressure Handling 100 SSU Liquid At Rated Speeds	Maximum Recommended Temperature for Low-Viscosity Pump, °F.		Approximate Shipping Weight With Valve
			50 PSI	100 PSI				Packed	Mech. Seal	
Packed G125	1"	8 GPM	1/2	1/2	400	25,000	200	300	225	22
HL125	1 1/2"	15 GPM	1 1/2	2	400	7,500	200	300	225	40
AK125	2"	50 GPM	3	5	400	25,000	150	300	225	81
AL125	2"	75 GPM	5	7 1/2	400	25,000	150	300	225	105
K125	2"	80 GPM	5	7 1/2	400	25,000	200	300	225	110
KK125	2"	80 GPM	5	7 1/2	400	25,000	200	300	225	155
L125	2"	100 GPM	5 1/2	8	400	25,000	200	300	225	175
LQ125	2 1/2"	135 GPM	7 1/2	15	400	2,500	200	300	225	185
LL125	3"	140 GPM	7 1/2	15	400	2,500	150	300	225	190
LS125	3"	200 GPM	15	20	400	75,000	150	300	225	440
Q125	4"	400 GPM	50	30	400	7,500	150	300	225	600
M125	4"	420 GPM	20	40	400	25,000	150	300	225	600

① Buna-N elastomer used in mechanical seal of Series 4125 pumps.

② "G" and "Q" sizes have steel idler.

③ For mechanical seal pumps on applications with viscosities above 15,000 SSU, provide details for recommendation.

④ Ports are suitable for use with 125# ANSI cast iron or 150# ANSI steel companion flanges or flanged fittings. All others tapped for standard pipe.

⑤ Standard seal can be used from -20°F. to +225°F. With special construction, temperatures from -50°F. to +550°F. can be handled with this series pumps.

⑥ Nominal rating based on handling thin liquids.

⑦ "AK", "AL", "KK" and "LS" sizes have Ductile Iron rotor.

⑧ For maximum recommended discharge pressures when handling other viscosities and/or other speeds, see performance curves. Performance curves also show preferred constructions. If suction pressure exceeds 50 PSIG, consult factory.

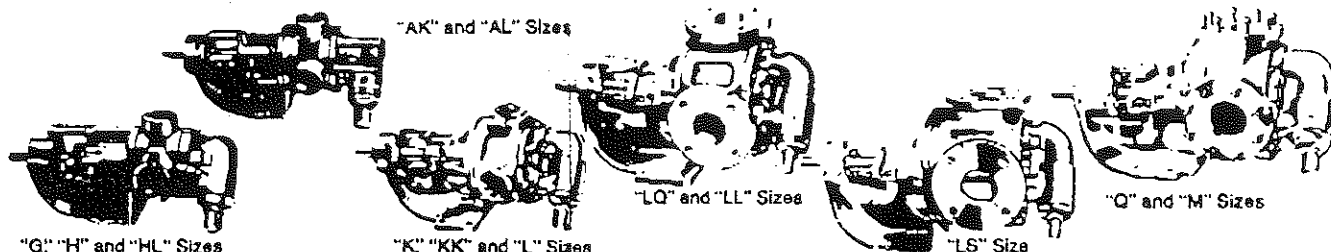
⑨ Check factory before using bronze rotors at viscosities normally requiring steel fitted construction. "G", "AK", "AL" and "LS" sizes not available in bronze fitted construction.

⑩ "AK", "AL", "LS", "Q" and "M" 4125 models furnished with carbon graphite bracket bushings and mechanical seal is mounted in stuffing box. Mechanical seal is mounted behind rotor in "G", "H", "HL", "K", "KK", "L", "LO" and "LL" pumps.

⑪ "AK" and "AL" sizes not available in steel fitted construction.

Viking Pump-Houdaille, Inc., A Subsidiary of Houdaille Industries, Inc. • Cedar Falls, Iowa 50613 U.S.A.



**SPATCO****10****VIKING® HEAVY-DUTY PUMPS  
SERIES 125 AND 4125****UNMOUNTED PUMPS**

This series of heavy-duty pumps is available either unmounted or mounted units as shown on following pages. Available with Multi-Ring stuffing box or Buna-N mechanical seal with carbon rotating and Ni-Resist stationary faces. The integral thrust bearing is designed to handle heavy-duty pumping jobs without problems of end play and distortion. For increased versatility of installation and complete selection of ports, the pump casing is designed so it can be rotated on the bracket to any 45° or 90° angle from

that shown in the illustrations. See revolvable casing feature on Page 141.3. Pressure relief valve on head is standard for this series. To permit use of this type pump in a greater range of applications, some sizes are available with jacketed head plate. For heavy-duty pumps with jacketed bracket and head, see Catalog Section 142.

Dimensions for Unmounted Pumps—See Page 141.11.

Performance Data for Unmounted Pumps—See Pages 141.17 through 141.42.

**CONSTRUCTION—SERIES 125 AND 4125 ("Q" THROUGH "M" SIZES)**

Pump Construction	Casing	Head	Bracket	Rotor	Idler	Rotor Shaft and Idler Pin	Bushings				Inlet Relief Valve
							Packed		Mech. Seal		
Standard Construction	Iron	Iron	Iron	① Iron	Iron	Steel	Bronze	Bronze	Carbon Graphite	② Bronze	Iron
③ Steel Fitted	Iron	Iron	Iron	Steel	④ Iron	Steel	Bronze	Bronze	Carbon Graphite	⑤ Bronze	Iron
⑥ Bronze Fitted	Iron	Iron	Iron	③ Bronze	Bronze	Steel	Bronze	Bronze	Carbon Graphite	⑥ Bronze	Iron

**SPECIFICATIONS—SERIES 125 AND 4125 UNMOUNTED PUMPS**

Model Number		Port Size	① Nominal Pump Rating		Motor HP Required At Rated Speed Pumping 100 SBU Liquid		Maximum Hydro-Static Pressure	Steel Fitted Construction Recommended Above This Viscosity	④ Max. Rec. Discharge Pressure Handling 100 SBU Liquid At Rated Speeds	⑤ Maximum Recommended Temperature for Cataloged Pump, °F.		Approximate Shipping Weight With Valve
Packed	① ② Mech. Seal	Inches	GPM	RPM	50 PSI	100 PSI	PSIG	SBU	PSIG	Packed	Mech. Seal	Pounds
G125	G4125	1	8	1800	1¼	1½	400	7,500	200	300	225	22
H125	H4125	1½	15	1800	1¼	2	400	25,000	200	300	225	38
HL125	HL4125	1½	30	1800	2	3	400	7,500	200	300	225	40
AK125	AK4125	2	50	1200	3	5	400	⑥ 25,000	150	300	225	78
AL125	AL4125	2	75	1200	5	7½	400	⑦ 25,000	150	300	225	81
K125	K4125	2	60	840	3	7½	400		200	300	226	105
KK125	KK4125	2	80	640	5	7½	400	25,000	200	300	225	110
L125	L4125	2	135	640	7½	15	400	25,000	200	300	225	155
LQ125	LQ4125	⑧ 2½	135	640	7½	15	400	25,000	200	300	225	175
LL125	LL4125	③ 3	140	520	7½	15	400	2,500	200	300	225	185
LS125	LS4125	③ 3	200	640	15	20	400	75,000	150	300	225	190
Q125	Q4125	④ 4	300	520	20	30	400	7,500	150	300	225	440
M125	M4125	④ 4	420	420	20	40	400	25,000	150	300	225	600

① Buna-N elastomer used in mechanical seal of Series 4125 pumps.

② "G" and "Q" sizes have steel idler.

③ For mechanical seal pumps on applications with viscosities above 15,000 SBU, provide details for recommendation.

④ Ports are suitable for use with 125# ANSI cast iron or 150# ANSI steel companion flanges or flanged fittings. All others tapped for standard pipe.

⑤ Standard seal can be used from -20°F. to +225°F. With special construction, temperatures from -80°F. to +650°F. can be handled with this series pumps.

⑥ Nominal rating based on handling thin liquids.

⑦ "AK", "AL", "KK" and "LS" sizes have Ductile Iron rotor.

⑧ For maximum recommended discharge pressures when handling other viscosities and/or other speeds, see performance curves. Performance curves also show preferred constructions. If suction pressure exceeds 50 PSIG, consult factory.

⑨ Check factory before using bronze rotors at viscosities normally requiring steel fitted construction. "G", "AK", "AL" and "LS" sizes not available in bronze fitted construction.

⑩ "AK", "AL", "LS", "Q" and "M" 4125 models furnished with carbon graphite bracket bushings and mechanical seal is mounted in stuffing box. Mechanical seal is mounted behind rotor in "G", "H", "HL", "K", "KK", "L", "LQ" and "LL" pumps.

⑪ "AK" and "AL" sizes not available in steel fitted construction.



Charlotte, NC (704)506-4377  
Greenville, SC (803)250-0135

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Memphis, TN (901)427-4826  
Knoxville, TN (615)938-7728

Memphis, TN (901)427-4826  
Nashville, TN (615)350-8080

Lawrenceville, GA (800)555-2550

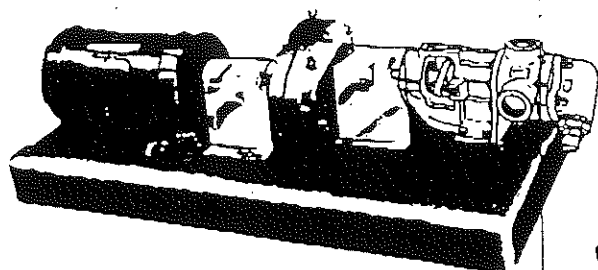
# SPATCO

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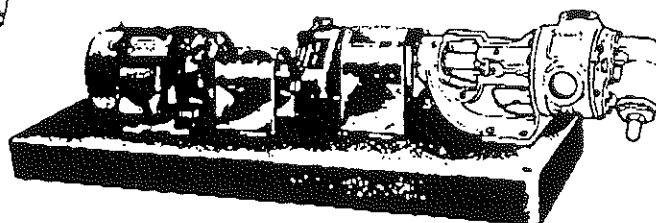
## VIKING® HEAVY-DUTY PUMPS

### SERIES 125 AND 4125

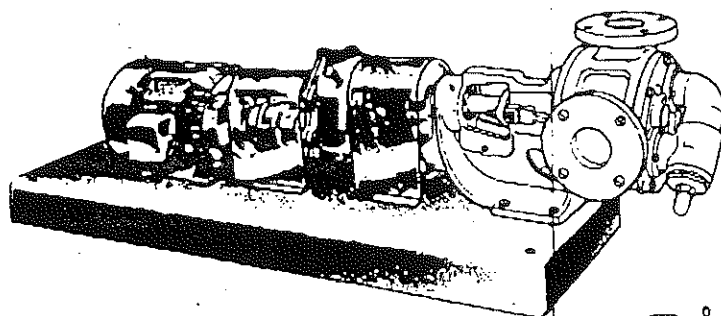
#### VIKING HELICAL GEAR REDUCTION UNITS ("R" DRIVE)



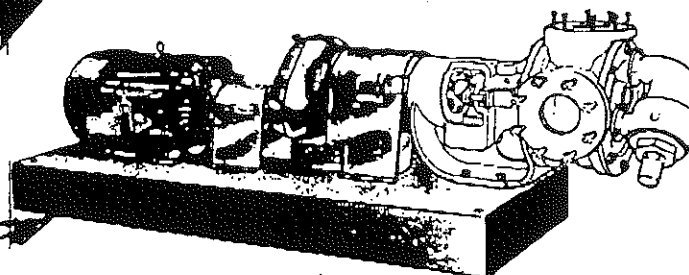
SERIES 125 and 4125 Pumps  
with "R" Drive "A" Reducer



SERIES 125 and 4125 Pumps  
with "R" Drive "B" Reducer



SERIES 125 and 4125 Pumps  
with "R" Drive "C" Reducer



SERIES 125 and 4125 Pumps  
with "R" Drive "D" Reducer

Viking's heavy-duty pump Series 125 and 4125 are available with helical gear reducers that have been specifically developed for efficient operation with Viking heavy-duty pumps. These rugged, compact, exceptionally quiet gear reducers come in three sizes: the "small" A size, "medium" B size and "large" C size.

The "A" size reducer, available with four gear ratios (2.24, 2.76, 3.43 and 4.17 to 1), is ideally suited for use with the "G," "H," "HL," "AK" and "AL" size pumps. This reducer is bracket mounted and requires couplings on both the input and output shafts. With the "A" size reducer and 1200 or 1800 RPM motors, the "G," "H," "HL," "AK" and "AL" size pumps can be used to cover a capacity range from 3.2 to 51 GPM.

The medium size "B" helical gear reducer is available with six gear ratios from 2.76 to 1 to 7.65 to 1. This size normally is used with pump sizes "AK" through "LS." Like the

"A" reducer, the "B" reducer is bracket mounted and requires couplings on both the input and the output shafts. With the "B" reducer, "AK" through "LS" pumps driven by 1200 or 1800 RPM motors can be used to cover a capacity range from 6 to 213 GPM.

The large "C" size reducer also is available with six gear ratios from 2.80 to 1 to 7.95 to 1. It is normally used with the "KK" through "M" size pumps. Like the "A" and "B" reducers, the "C" reducer is bracket mounted and requires flexible couplings both for the input and output shafts. With the "C" reducer, "KK" through "M" size pumps, driven by 1200 or 1800 RPM motors, can cover a capacity range from 15 to 410 GPM.

Dimensions for "R" Drive Units—See Pages 141.12 and 141.13.  
Performance Data for "R" Drive Units—See Pages 141.17 through 141.42.



**SPATCO****12****VIKING® HEAVY-DUTY PUMPS****SERIES 125 AND 4125****VIKING HELICAL GEAR REDUCTION UNIT ("R" DRIVE)****HELICAL REDUCER SPECIFICATIONS AND PUMP CAPACITY TABLE—"A" SIZE**

Motor RPM	Reducer Ratio	Max. Motor HP	Pump RPM	PUMP MODELS AND CAPACITY GPM WITH SIZE "A" REDUCER									
				Q125R or Q4125R		M125R or M4125R		HL125R or HL4125R		AK125R or AK4125R		AL125R or AL4125R	
				50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI
1800	2.24 to 1	5	780	3.7	3.3	8.6	6.3	13.4	13.0	36.5	36.0	51	50
	2.76 to 1	5	640	2.8	2.5	5.3	5.1	10.9	10.5	29.5	29.0	42	41
	3.43 to 1	3	520	2.2	1.8	4.2	3.9	8.6	8.2	23.8	23.3	34	33
	4.17 to 1	3	420	1.7	1.3	3.3	3.0	6.8	6.4	19.2	18.7	27	26
1200	2.24 to 1	3	520	2.2	1.8	4.2	3.9	8.6	8.2	23.8	23.3	34	33
	2.76 to 1	3	420	1.7	1.3	3.3	3.0	6.8	6.4	19.2	18.7	27	26
	3.43 to 1	2	350	1.2	1.0	2.6	2.3	5.4	5.0	15.3	14.8	23	22
	4.17 to 1	2	280	1.0	0.8	2.0	1.7	4.2	3.8	11.0	10.5	18	17

**HELICAL REDUCER SPECIFICATIONS AND PUMP CAPACITY TABLE—"B" SIZE**

Motor RPM	Reducer Ratio	Max. Motor HP	Pump RPM	PUMP MODELS AND CAPACITY GPM WITH SIZE "B" REDUCER											
				AK125R or AK4125R		AL125R or AL4125R		K125R or K4125R		KK125R or KK4125R		L125R, LQ125R, L4125R or LQ4125R		LL125R or LL4125R	
				50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI	50 PSI	100 PSI
1800	2.76 to 1	15	640	29.5	29.0	42	41	65	64	84	83	144	143	213	209
	3.40 to 1	10	520	23.8	23.3	34	33	53	52	68	68	117	116	147	146
	4.19 to 1	10	420	19.2	18.7	27	26	42	41	54	53	94	93	117	116
	5.06 to 1	10	350	15.3	14.8	23	22	35	34	44	43	77	76	96	95
	6.27 to 1	7 1/2	280	11.0	10.5	18	17	27	26	34	33	61	60	75	74
	7.65 to 1	5	230	8.0	7.5	15	14	22	21	27	26	50	49	61	60
	7.65 to 1	5	230	8.0	7.5	15	14	22	21	27	26	50	49	61	60
1200	2.76 to 1	10	420	19.2	18.7	27	26	42	41	54	53	94	93	117	116
	3.40 to 1	10	350	15.3	14.8	23	22	35	34	44	43	77	76	96	95
	4.19 to 1	7 1/2	280	12.0	11.5	18	17	27	26	34	33	61	60	75	74
	5.06 to 1	7 1/2	230	10.0	9.5	15	14	22	21	27	26	50	49	61	60
	6.27 to 1	5	190	8.0	7.5	12	11	18	17	22	21	40	39	50	49
	7.65 to 1	5	155	6.0	5.5	9	8	14	13	17	16	31	30	38	37
	7.65 to 1	5	155	6.0	5.5	9	8	14	13	17	16	31	30	38	37

**HELICAL REDUCER SPECIFICATIONS AND PUMP CAPACITY TABLE—"C" SIZE**

Motor RPM	Reducer Ratio	Max. Motor HP	Pump RPM	PUMP MODELS AND CAPACITY GPM WITH SIZE "C" REDUCER									
				KK125R or KK4125R		L125R, LQ125R, L4125R or LQ4125R		LL125R or LL4125R		L8125R or L84125R		Q125R or Q4125R	
				200 PSI	150 PSI	200 PSI	150 PSI	200 PSI	150 PSI	200 PSI	150 PSI	50 PSI	100 PSI
1800	2.80 to 1	40	640	82	142	141	140	140	140	205	205	307	302
	3.31 to 1	40	520	65	115	114	114	114	114	164	164	241	236
	4.21 to 1	30	420	52	92	91	91	91	91	130	130	193	188
	5.08 to 1	25	350	42	75	74	74	74	74	107	107	155	150
	6.24 to 1	20	280	32	58	58	58	58	58	82	82	115	110
	7.95 to 1	15	230	25	46	47	47	47	47	66	66	93	88
	7.95 to 1	15	230	25	46	47	47	47	47	66	66	93	88
1200	2.80 to 1	30	420	52	92	91	91	91	91	130	130	193	188
	3.31 to 1	25	350	42	75	74	74	74	74	107	107	155	150
	4.21 to 1	20	280	32	58	58	58	58	58	82	82	115	110
	5.08 to 1	20	230	25	46	47	47	47	47	66	66	93	88
	6.24 to 1	15	190	20	38	37	37	37	37	51	51	69	64
	7.95 to 1	10	155	15	29	28	28	28	28	39	39	51	48
	7.95 to 1	10	155	15	29	28	28	28	28	39	39	51	48

⚠ Recommended maximum motor horsepower based on 8-10 hour per day service (Service Factor of 1.0). For other time length of service per day, see Service Factor table and Reducer Horsepower tables in General Catalog Section.

610 or Technical Service Manual (TSM-610) to determine reducer capabilities.  
 ⚠ Capacities are based on 100 SSU liquid and 15" Mercury Vacuum.





## Tank Protection Division

- ❑ Sizes 2" through 12"
- ❑ Pressure settings  $\frac{1}{2}$  oz/in<sup>2</sup> to 15 PSIG
- ❑ Vacuum settings  $\frac{1}{2}$  oz/in<sup>2</sup> to 12 PSIG
- ❑ Available in aluminum (type 356), carbon steel, stainless steel and other materials.
- ❑ Modular construction

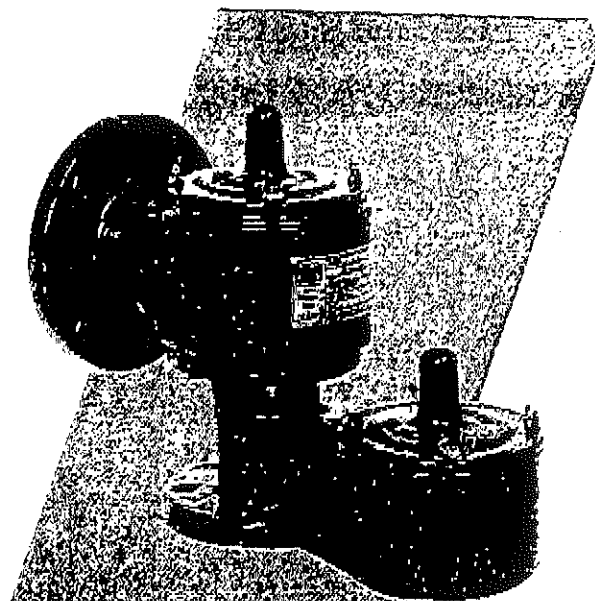
### PRESSURE / VACUUM RELIEF VALVE WITH PIPE-AWAY FEATURE

Model 1220A is used for pressure and vacuum relief where vapors must be piped away. Special pallers in the Model 1220A housing virtually eliminate the intake of air and the escape of vapors except during normal tank breathing, thus reducing the loss of product. These special pallers are engineered to allow only the intake or outlet relief necessary to maintain the proper working pressure, thereby protecting the tank from possible damage. Escaping vapors are piped away through a flanged outlet connection. This helps to provide increased fire protection and safety.

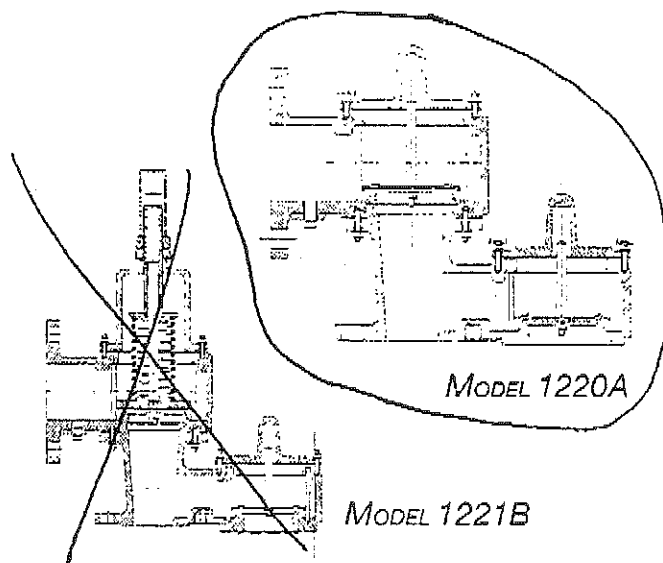
### SPECIAL FEATURES

Model 1220A offers Groth's special "cushioned air" seating. Superior performing Teflon<sup>®</sup> seating diaphragms are standard to minimize sticking caused by resinous vapors and atmospheric moisture. The Model 1220A has a self draining housing body and drip rings to protect seating surfaces from condensate and freezing. This design also avoids pressure or vacuum buildup due to binding or clogging of the valve. Buna-N, Viton<sup>®</sup> and other seating diaphragms can be provided when required. Model 1221B may be spring loaded when required for use on blanketed tanks or other type installation requiring higher settings. To insure the proper alignment of seating surfaces there is peripheral guiding and a center stabilizing stem.

## Pressure/Vacuum Relief Valve with Pipe-Away Feature Model 1220A



MODEL 1220A



### GROTH, THE CAPABILITY COMPANY

As with all Groth products, every Model 1220A is factory inspected and tested to meet your critical requirements and special needs. Inventory is maintained to insure rapid delivery.





THIS CHART SHOWS CAPACITIES  
FOR PRESSURE/VACUUM VENT  
WITH FLAME ARRESTER

PRESSURE RELIEF CAPACITY

MODEL 1220A/7618

Set Pressure (P.)		Air Flow Capacity at 100% Over-pressure (Double Set Pressure) 1000 Standard Cubic Feet per Hour at 60° F						
In WC	Oz/Sq In	2"	3"	4"	6"	8"	10"	12"
0.87	0.50	2.92	5.68	10.3	20.7	32.3	51.5	59.1
→ 1.00	0.58	3.19	6.34	11.5	23.3	36.2	57.6	67.8
1.73	1.00	4.45	9.23	16.8	34.4	53.0	84.4	105
2.00	1.16	4.84	10.1	18.5	37.8	58.2	92.6	116
2.60	1.50	5.64	11.9	21.7	44.6	68.5	109	138
3.00	1.73	6.12	13.0	23.7	48.8	74.8	119	151
3.46	2.00	6.65	14.1	25.9	53.2	81.6	130	165
4.00	2.31	7.21	15.4	28.2	58.0	88.9	141	180
6.00	3.47	9.07	19.5	35.7	73.6	113	179	230
8.00	4.62	10.7	23.0	42.1	86.8	133	211	272
10.0	5.78	12.1	26.1	47.7	98.6	151	240	309
12.0	6.93	13.3	28.9	52.9	109	167	266	343
15.0	8.66	15.1	32.7	60.0	124	189	301	389
20.0	11.6	17.7	38.4	70.4	146	222	354	457
25.0	14.4	20.0	43.5	79.7	165	252	400	518
30.0	17.3	22.2	48.1	88.2	182	278	443	574

Flow capacity is certified by Groth Corporation, based on actual tests conducted in compliance with API Std. 2000.  
Flow measurement accuracy has been verified by an independent testing laboratory.

Flow capacity values listed above are based on full open valves at 100% over-pressure.

Consult Factory for flow capacity with fiberglass valve.

Read the flow capacity at 100% over-pressure directly from the table above. Use linear interpolation if the set pressure is not listed. (Ref: Page TPD1)

If the allowable over-pressure is less than 100%, modify the flow capacity using the appropriate "C" factor from the table. If allowable over-pressure is more than 100%, consult page TPD1 or your Groth Representative.

Calculate the percentage over-pressure by the following formula: Note that all pressures are gage pressure expressed in the same units of measure.

$P_f$  = Flowing pressure

$P_s$  = Set pressure

$$\% OP = [(P_f - P_s) / P_s] \times 100$$

Calculate flow capacity at less than 100% over-pressure according to the following example.

#### Example—Flow Capacity Calculation

6" Model 1220A/7618

4 In WC set pressure ( $P_s$ )

7 In WC flowing pressure ( $P_f$ )

1. Read flow capacity at set pressure from table
2. Calculate over-pressure
3. Read "C" factor from table
4. Calculate flow capacity

Flow = 58,000 SCFH

$$\% OP = [(7 - 4) / 4] \times 100 = 75\%$$

"C" = 0.87

$$Flow = 0.87 \times 58,000 = 50,460 SCFH$$

#### Example—To find "C" factor from table:

Read "C" factor for 75% Over-pressure at intersection of row 70 and column 5

"C" factor at 75% OP = 0.87

"C" Factor Table										
%OP	0	1	2	3	4	5	6	7	8	9
10	Consult Factory									
20										
30										
40										
50	0.72	0.73	0.73	0.74	0.75	0.75	0.76	0.77	0.77	0.78
60	0.78	0.79	0.80	0.80	0.81	0.81	0.82	0.82	0.83	0.84
70	0.84	0.85	0.85	0.86	0.86	0.87	0.88	0.88	0.89	0.89
80	0.90	0.90	0.91	0.91	0.91	0.92	0.93	0.93	0.94	0.94
90	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.99	0.99	1.00

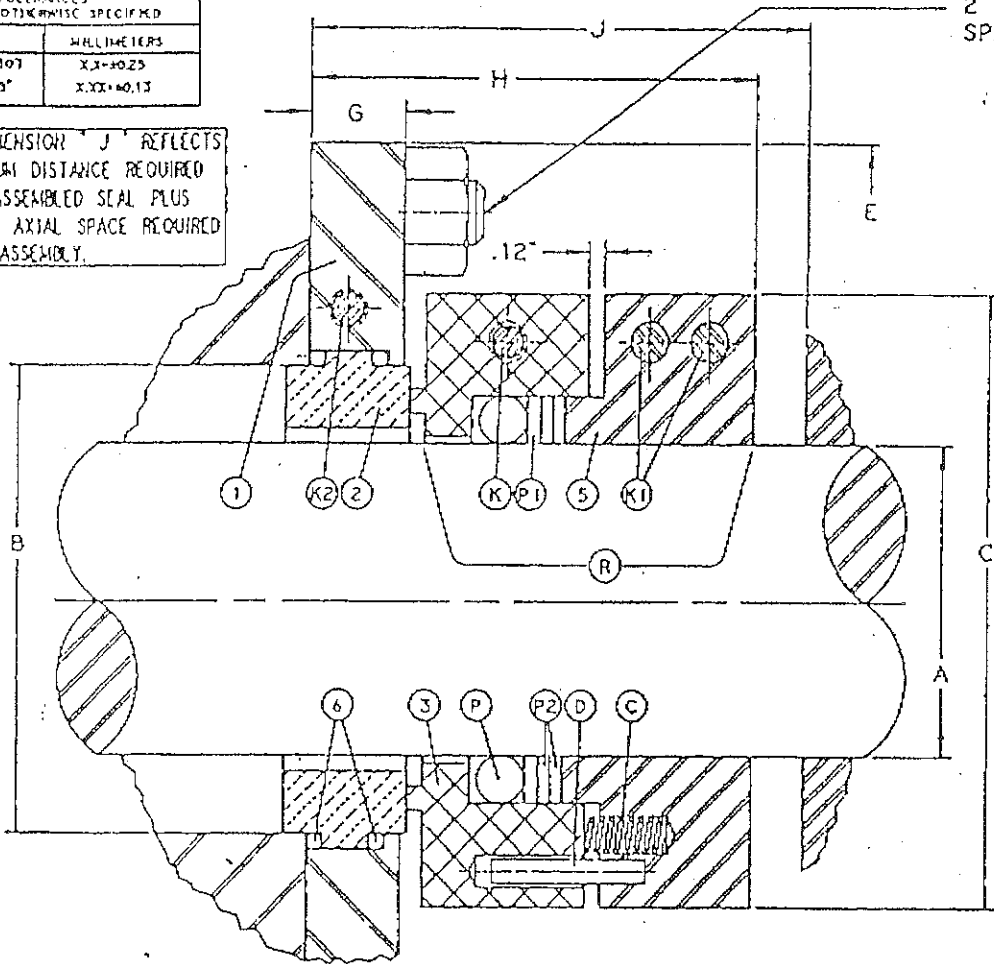


TOLERANCES UNLESS OTHERWISE SPECIFIED	
DIMENSIONS	MILLIMETERS
X.XX ± .01 / .0107	X.X ± .025
X.XXX ± .005	X.XX ± .013

NOTE: DIMENSION "J" REFLECTS THE MINIMUM DISTANCE REQUIRED FOR THE ASSEMBLED SEAL PLUS ADDITIONAL AXIAL SPACE REQUIRED OR SEAL ASSEMBLY.

2 - D Φ STUDS EO.  
SPACED ON F B.C.

NO.	DATE	REVISION



A ±.001"	B	C	D MIN.	E MIN.	F MIN.	G	H	J MIN.
1.000	2.250	3.38	.500	5.75	4.75	.75	3.44	4.44
1.125	2.375	3.50	.500	5.88	4.88	.75	3.44	4.44
1.250	2.500	3.62	.500	6.00	5.00	.75	3.44	4.44
1.375	2.625	3.75	.500	6.12	5.12	.75	3.44	4.44
1.500	2.750	3.88	.500	6.25	5.25	.75	3.44	4.44
1.625	2.875	4.00	.500	6.38	5.38	.75	3.44	4.44
1.750	3.000	4.12	.500	6.50	5.50	.75	3.44	4.44
1.875	3.125	4.25	.500	6.62	5.62	.75	3.44	4.44
2.000	3.250	4.38	.500	6.75	5.75	.75	3.44	4.44
2.125	3.375	4.50	.500	6.88	5.88	.75	3.44	4.44
2.250	3.500	4.62	.500	7.00	6.00	.75	3.44	4.44
2.375	3.625	4.75	.500	7.12	6.12	.75	3.44	4.44
2.500	3.750	4.88	.500	7.25	6.25	.75	3.44	4.44
2.625	3.875	5.00	.500	7.38	6.38	.75	3.44	4.44
2.750	4.000	5.12	.500	7.50	6.50	.75	3.44	4.44
2.875	4.125	5.25	.500	7.62	6.62	.75	3.44	4.44
3.000	4.250	5.38	.500	7.75	6.75	.75	3.44	4.44
3.125	4.375	5.50	.500	7.88	6.88	.75	3.44	4.44
3.250	4.500	5.62	.500	8.00	7.00	.75	3.44	4.44
3.375	4.625	5.75	.500	8.12	7.12	.75	3.44	4.44
3.500	4.750	5.88	.500	8.25	7.25	.75	3.44	4.44
3.625	4.875	6.00	.500	8.38	7.38	.75	3.44	4.44
3.750	5.000	6.12	.500	8.50	7.50	.75	3.44	4.44
3.875	5.125	6.25	.500	8.62	7.62	.75	3.44	4.44
4.000	5.250	6.38	.500	8.75	7.75	.75	3.44	4.44
4.125	5.375	6.50	.500	8.88	7.88	.75	3.44	4.44
4.250	5.500	6.62	.500	9.00	8.00	.75	3.44	4.44
4.375	5.625	6.75	.500	9.12	8.12	.75	3.44	4.44
4.500	5.750	6.88	.500	9.25	8.25	.75	3.44	4.44
4.625	5.875	7.00	.500	9.38	8.38	.75	3.44	4.44
4.750	6.000	7.12	.500	9.50	8.50	.75	3.44	4.44
4.875	6.250	7.25	.500	9.62	8.62	.75	3.44	4.44

ROTARY UNIT CONSISTING OF:		1	GLAND RING
SEAL RING		2	INSERT
COLLAR		6	O - RINGS
SPRINGS		K2	SHOULDER SCREWS
DRIVE PINS		P	SHAFT PACKING
SHOULDER SCREWS		P1	BACKUP RING
CAP SCREWS		P2	BACKUP RING

COMMENDED SPARE PARTS: 3, C, P, P1, P2, 2, 6

## MSS

# DURA SEALS

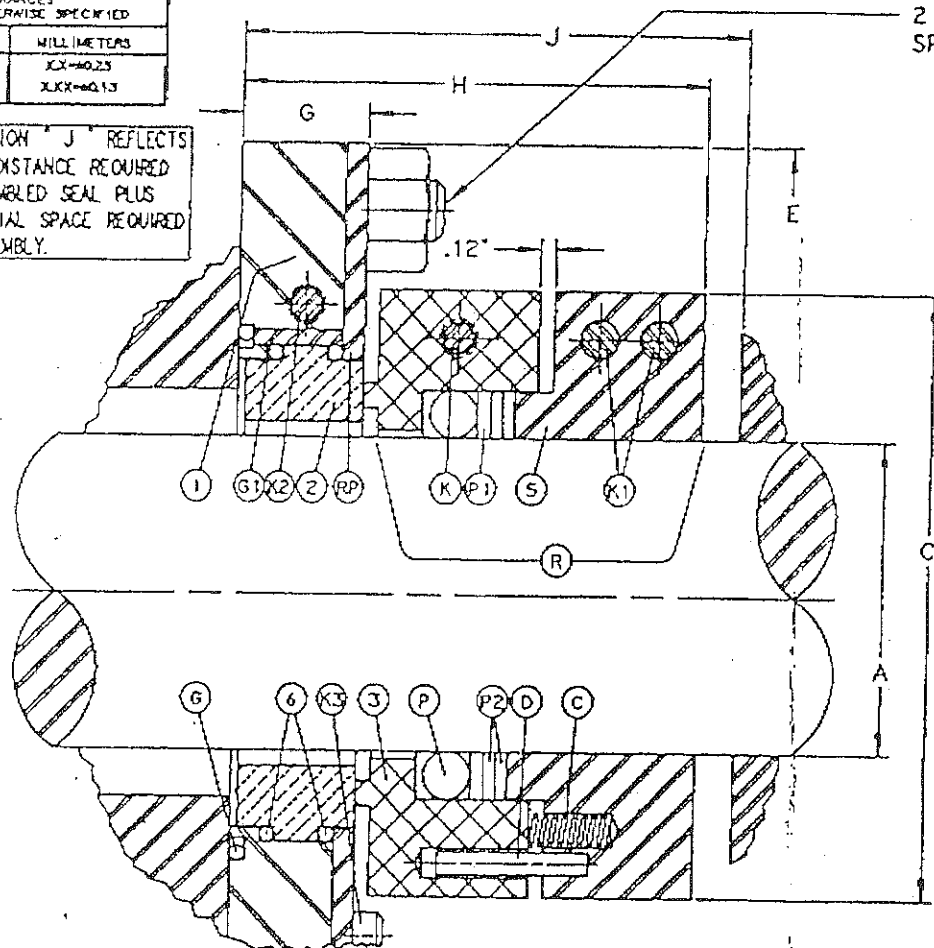
( WITH CLAMP STYLE COLLAR AND PLATING INSERT )

DURAMETALLIC CORPORATION		CALAMAZOO, MICH.
DATE: 3-30-88	SCALE: N.T.S.	
DRAWN: KLH		
CHECKED: [Signature]		
FORM:		
SHEET 1 OF 2		DRAWING NO. 20-242631



NOTE: DIMENSION "J" REFLECTS THE MINIMUM DISTANCE REQUIRED FOR THE ASSEMBLED SEAL PLUS ADDITIONAL AXIAL SPACE REQUIRED FOR SEAL ASSEMBLY.

NO.	DATE	REVISIONS
	2-3-81	ADDED GASKET PART 81



A ±001*	C	D MIN.	E MIN.	F MIN.	G	H	J MIN.
1.000	3.38	.500	5.75	4.75	1.06	3.69	4.69
1.125	3.50	.500	5.88	4.88	1.06	3.69	4.69
1.250	3.62	.500	6.00	5.00	1.06	3.69	4.69
1.375	3.75	.500	6.12	5.12	1.06	3.69	4.69
1.500	3.88	.500	6.25	5.25	1.06	3.69	4.69
1.625	4.00	.500	6.38	5.38	1.06	3.69	4.69
1.750	4.12	.500	6.50	5.50	1.06	3.69	4.69
1.875	4.25	.500	6.62	5.62	1.06	3.69	4.69
2.000	4.38	.500	6.75	5.75	1.06	3.69	4.69
2.125	4.50	.500	6.88	5.88	1.06	3.69	4.69
2.250	4.62	.500	7.00	6.00	1.06	3.69	4.69
2.375	4.75	.500	7.12	6.12	1.06	3.69	4.69
2.500	4.88	.500	7.25	6.25	1.06	3.69	4.69
2.625	5.00	.500	7.38	6.38	1.06	3.69	4.69
2.750	5.12	.500	7.50	6.50	1.06	3.69	4.69
2.875	5.25	.500	7.62	6.62	1.06	3.69	4.69
3.000	5.38	.500	7.75	6.75	1.06	3.69	4.69
3.125	5.50	.500	7.88	6.88	1.06	3.69	4.69
3.250	5.62	.500	8.00	7.00	1.06	3.69	4.69
3.375	5.75	.500	8.12	7.12	1.06	3.69	4.69
3.500	5.88	.500	8.25	7.25	1.06	3.69	4.69
3.625	6.00	.500	8.38	7.38	1.06	3.69	4.69
3.750	6.12	.500	8.50	7.50	1.06	3.69	4.69
3.875	6.25	.500	8.62	7.62	1.06	3.69	4.69
4.000	6.38	.500	8.75	7.75	1.06	3.69	4.69
4.125	6.50	.500	8.88	7.88	1.06	3.69	4.69
4.250	6.62	.500	9.00	8.00	1.06	3.69	4.69
4.375	6.75	.500	9.12	8.12	1.06	3.69	4.69
4.500	6.88	.500	9.25	8.25	1.06	3.69	4.69
4.625	7.00	.500	9.38	8.38	1.06	3.69	4.69
4.750	7.12	.500	9.50	8.50	1.06	3.69	4.69
4.875	7.25	.500	9.62	8.62	1.06	3.69	4.69

MSS  
DURA SEALS  
( WITH CLAMP STYLE COLLAR AND NONPLOTING INSERT )

DATE: J-30-00	SCALE: N.T.S.
DRAWN: KLM	SHEET 1 OF 2
TRACED:	
CHECKED:	
FORM:	DRAWING NO. 2D-242633-R



## SECTION 13220

### ABOVEGROUND STORAGE TANK

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Furnish and install four 12,000-gallon carbon steel aboveground storage tanks.
- B. Furnish and install new tank accessories and controls as shown on plan sheets or specified herein.

##### 1.02 REFERENCES

- A. NFPA 30--Flammable and Combustible Liquids Code.
- B. Underwriters Laboratory--Standard for Safety 1316.
- C. File MH 9061 for storage of flammable liquids.

##### 1.03 SUBMITTALS

- A. Submit shop drawings and product data.
- B. Indicate for each tank, location of all fittings, accessories, critical dimensions, anchoring devices, attachment, piping, and accessories.
- C. Submit manufacturer's installation and testing instructions.

##### 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site.
- B. Store and protect products.
- C. Handle and store tank at site in accordance with manufacturer's instructions and recommendations.
- D. Secure tanks with tie downs at site until installed.

#### PART 2 PRODUCTS

##### 2.01 DESIGN PARAMETERS

- A. The storage tanks shall be designed with a vertical configuration with a dish bottom and a flat top. See Sheet 9



of 10. The bottom is dished to prevent material bridging during discharge and to improve mixability of any residual solids. The top of the tank is flat to permit easy access to top entering fittings. The top of tank(s) will have a peripheral handrail to protect personnel. The top of the tank will have additional channel stiffeners to support mixer weight and torque.

- B. The tank will be of 5/16-inch wall thickness which will permit up to 1/8-inch for corrosion and erosion allowance. However, the waste solvents and inks being processed would not be expected to be corrosive to carbon steel.
- C. The discharge from the tank(s) will be from the very bottom. The fill point for the tank(s) will be near the bottom of the vertical wall. A check valve will be located in the influent line adjacent to the tank to prevent tank drainage in the unlikely event of pipe failure upstream in the influent line to the storage tank(s).
- D. The outside surface of the tank(s) will be prepped, primed, and finished with an alkyd enamel.
- E. The tank(s) will be provided with a pressure / vacuum vent for normal operation and an emergency bent for abnormal operation. In addition, the unfilled portion of the tank(s) will be blanketed with nitrogen to prevent an explosive atmosphere from existing in the tank(s).
- F. The tank(s) will be provided with a liquid level indicator to monitor tank operation.

## 2.02 AUXILIARY PIPING

- A. The piping to the tank farm will be enclosed in a secondary containment trough. See Sheet 10 of 10. The trough will be supported with columns at 25-foot centers. The lower portion of the pipe support column will be constructed of reinforced concrete to prevent pipe support damage from a wayward vehicle. The piping and trough will slope towards the tank farm with an integral sump at the tank farm end of the trough. The sump will have a liquid sensor to detect any leak in the process piping.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Perform pre-installation tank tightness testing according to manufacturer's instructions to verify tank integrity prior to



installation.

- B. Verify that dimensions and elevations are as shown on plan sheets prior to placement of tank.

### 3.02 TANK INSTALLATION

- A. Install tank in strict accordance with manufacturer's written instructions, API Recommended Practice 1615 where applicable, and as indicated on plan sheets. Call to the attention of Architect / Engineer any conflict between manufacturer's recommendations and requirements herein for resolution.
- B. Install tank inventory probe and connect to new console according to manufacturer's written instructions and as required for a properly operating system. Provide all required electrical conduits, circuits, and connections from console to equipment at tank as necessary for proper operation of equipment.

END OF SECTION



## Stress Calculations





Engineers &amp; Scientists

PROJECT NO. 957701

BY: CRM

DATE: 3.29.95

SHEET

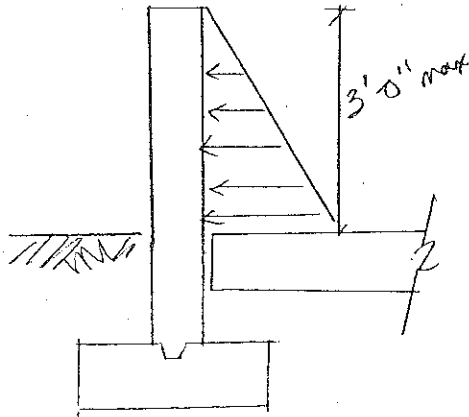
GRAEF  
ANHALT  
SCHLOEMER  
and Associates Inc.

PROJECT EDO ENVIRONMENTAL

CHECKED BY:

DATE:

## TANK FARM - CONTAINMENT WALL



$$WT = 62.4 \text{ pcf} (2.5) = 156 \text{ pcf} / \text{ft}$$

FOR 1'-0" WIDE SET. 156 PLF/FT

$$M_u = \frac{1.7 (156 \text{ PLF/ft}) (3')^3}{6} = 1.2 \text{ k-ft}$$

TRY 12" THICK WALL

$$d = 12" - 3" - \frac{1}{2}" = 8.5"$$

$$b = 12"$$

$$f'_c = 4000 \text{ psi}$$

$$f_y = 60 \text{ ksi}$$

$$F = \frac{bd^2}{12000} = \frac{12(8.5)^2}{12000} = 0.072$$

$$K = \frac{M_u}{F} = \frac{1.2}{0.072} = 16.67$$

$$\rho_{min} = 1.33(0.0013) = 0.0017$$

$$A_{st} = 0.0017(12" \times 8.5") = 0.17 \text{ in}^2 / \text{ft}$$

$$\#4 @ 12" \text{ o.c. } A_{st} = 0.2 \text{ in}^2 / \text{ft} \text{ (VERTICAL)}$$

min wall reinforcement -

$$\text{vert. } \rho = 0.0012$$

$$\text{horiz. } \rho = 0.002$$

$$\text{Vert} = 0.0012(12" \times 12") = 0.173 \text{ in}^2 / \text{ft}$$

$$\text{Horiz} = 0.002(12 \times 12) = 0.288 \text{ in}^2 / \text{ft}$$

WITH 2 FACES OF STEEL

USE #4 @ 12" o.c.

$$2(0.2 \text{ in}^2 / \text{ft}) = 0.4 \text{ in}^2 / \text{ft}$$

1.0 RE #4 @ 12" o.c. FOR MIN. WALL REINFORCEMENT



Sheet 1 of 2

# TANK FARM MAT FOUNDATION DESIGN

PRELIMINARY

DETERMINE UNIFORM LOAD UNDER TANKS

FULL TANK WEIGHT

MATERIAL STORED SPECIFIC GRAVITY = 2.5

$$12000 \text{ gallons} = 1605 \text{ ft}^3$$

$$W = 62.4 \text{ pcf} \times 2.5 \times 1605 \text{ ft}^3 = 250\text{K} + 5\% \text{ FOR TANK WT}$$

$$250\text{K} + 12.5\text{K} = 262.5\text{K}$$

USE 280K/TANK

EACH TANK HAS 4 POSTS

$$\frac{280\text{K}}{4} = 70\text{K/POST}$$

FOR ENTIRE MAT SLAB THERE IS A 30' x 30' <sup>LOAD</sup> DISTRIBUTION AREA

$$4 \text{ TANKS} \times 280\text{K/TANK} = 1120\text{K}$$

$$\frac{1120\text{K}}{30' \times 30'} = 1.244 \text{ ksf} = 1244 \text{ psf} \quad \text{UNIFORM LOADING}$$

ASSUMED ALLOWABLE BEARING PRESSURE = 1500 PSF

(THIS WILL BE REVISED AS REQ'D BASED ON THE COMPLETION OF A SOILS REPORT)

DETERMINE PRELIMINARY SLAB THICKNESS  
(CHECK 2-WAY SHEAR)

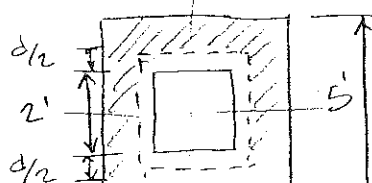
$$f'_c = 3000 \text{ psi} \quad 2' \times 2' \text{ PAD} \quad \text{ASSUME } h = 16" \quad d = 16" - 3" - \frac{1}{2}" = 12.5"$$

$$V_c = \left(2 + \frac{4}{f'_c}\right) \sqrt{f'_c} b_o d \quad b_o = \frac{b}{a_c} \geq 2 \quad f_c = 1.0 \quad b_o = (4)(2' + 12.5") = 146"$$

$$V_c = 4 \sqrt{3000} (146") (12.5") = 400\text{K}$$

$$\phi V_c = .85(400\text{K}) = 340\text{K} \quad \text{ALLOWABLE.}$$

FOR  $V_u$ : ASSUME 5' x 5' TRUB AREA PER PAD



$$V_u = 1.244 \text{ ksf} (1.7) [(5' \times 5') - (2' + 12.5")^2] = 33.3\text{K}$$

$$\text{OR } V_u = 70\text{K} (1.7) = 119\text{K}$$

$$\phi V_c > V_u \quad \text{OK USE } 16"$$



Sheet 2 of 2

TANK FARM

MAT FOUNDATION DESIGN (CONT)

PRELIMINARY

DETERMINE REINF. IN MAT SLAB.

USE 5'-0" LONG x 1'-0" WIDE STRIP

$$M_u = \frac{1.244 \text{ ksf} (1') (5')^2 (1.7)}{2} = 26.44 \text{ k-ft/ft}$$

$$d = 12.5" \quad b = 12"$$

$$F = \frac{bd^2}{12000} = \frac{12(12.5)^2}{12000} = 0.156$$

$$K = \frac{26.44}{0.156} = 169.5 \Rightarrow 170$$

$$\rho = 0.0030$$

$$A_{st} = 0.003(12)(12.5) = 0.45 \text{ in}^2/\text{ft}$$

USE #6 @ 12" O.C.

$$A_{gural} = 0.44 \text{ in}^2/\text{ft}$$

USE #6 @ 12" O.C. EA. WAY TOP & BOTTOM



## **Structural & Stress Calculations**



## LAB PACK STORAGE TANKS DESIGN

Acid Storage Tank - 5500 GAL

Caustic Storage Tank - 5500 GAL

$$\phi = 8 \text{ ft}$$

$$\begin{aligned} A &= \pi r^2 \\ &= \pi (4)^2 \\ &= 50.24 \text{ ft}^2 \end{aligned}$$

$$\begin{aligned} V_{\text{ft}} &= 50.24 \text{ ft}^2 \times \frac{7.48 \text{ gal}}{\text{ft}^3} \\ &= 375.8 \text{ gal / ft} \end{aligned}$$

Required Height

$$\begin{aligned} H &= \frac{5500 \text{ Gal}}{375.8 \text{ gal / ft}} \\ &= 14.64 \text{ ft} \end{aligned}$$

Assume Dish Depth of  $1\frac{1}{2}$  ft



(P) Pressure at bottom of vessel

Assume specific gravity = 2.0

Vessel  $\phi$  = 8 ft

Vessel Straight Wall = 14 ft

Depth of Dish = 1 1/2 ft

$$P = (14 + 1.5') (2.0) (62.4 \text{ lbs/ft}^3)$$

$$= 1934 \text{ lbs/ft}^2$$

$$= 13.4 \text{ psi}$$

Per Pressure Vessel Handbook by Eugene Meggers

Assume

(E) joint efficiency = 0.70

(S) design stress = 17,500 psi

(P) design pressure = 13.4 psi

(R) tank radius = 48 inches

(L) dish arc radius = 96 inches



for Cylindrical shell (Long Seam)

$$\begin{aligned}
 t_{\text{wall thickness required}} &= \frac{PR}{SE + 0.4P} \\
 &= \frac{(13.4)(48)}{(17,500)(0.70) + 0.4(13.4)} \\
 &= 0.052 \text{ inches}
 \end{aligned}$$

for Torispherical Head

when  $L/r = 16 \frac{2}{3}$

$$\begin{aligned}
 t_{\text{wall thickness required}} &= \frac{0.885 PL}{SE + 0.8P} \\
 &= \frac{0.885 (13.4)(96)}{17,500 (0.70) + 0.8 (13.4)} \\
 &= 0.093 \text{ inches}
 \end{aligned}$$

$\therefore$  for  $\frac{1}{4}$ " thick tank dish

$$0.25" - 0.093"$$

= 0.157 inches of material

available for erosion or

corrossion in the event of lining failure





Engineers &amp; Scientists

PROJECT NO. 957910 BY: GJRDATE: 11-7-95

SHEET

PROJECT EOG Lab Pack

CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

1/5

LAB PACK STORAGE TANK CONCRETE DESIGN

5500 GAL ACID &amp; CAUSTIC TANKS

Full Tank Weight

Max Specific Gravity = 2.0

$$W = 5500 \text{ GAL} \times \frac{8.34 \text{ lb}}{\text{GAL}} \times 2.0$$

$$= 91740 \text{ lbs}$$

$$\begin{array}{r} 4600 \text{ lbs} \\ \hline 96,340 \text{ lbs} \end{array} \quad \begin{array}{l} 5\% \text{ Tank Wt Allowance} \end{array}$$

Each Tank has 4 Legs

$$\text{Wt per Leg} = \frac{96,340 \text{ lbs}}{4}$$

$$= 24,085 \text{ lbs}$$

Assume Allowable Bearing Capacity of 1500 psf

Required Footprint Per Leg

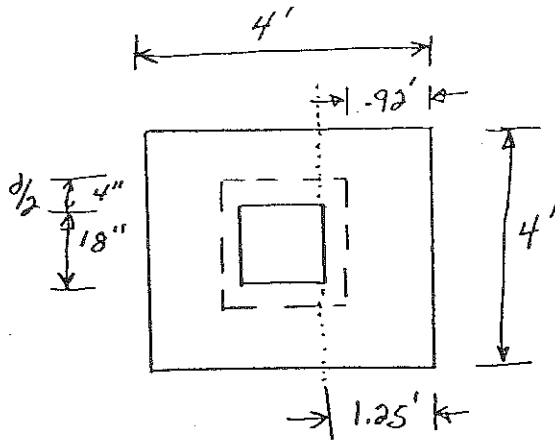
$$A = \frac{W}{1500 \text{ psf}}$$

$$= \frac{24,085 \text{ lbs}}{1500 \text{ psf}}$$

$$= 16.05 \text{ ft}^2$$

Assume 4' x 4' Footprint





Assume

Concrete thickness = 9"

No 5 rebar @ 18" c-c

rebar @ 5" from top

Concrete strength 3500psi

Bending moment in Slab Adjacent to <sup>Tank</sup> Foot plate

$$M = (1500 \text{ psf})(1.25 \text{ ft})(4 \text{ ft})(1.25/2 \text{ ft})$$

$$= 4687 \text{ ft-lb}$$

$$M_{ult} = 4687 \text{ ft-lb} \times 1.7 \text{ (safety factor)}$$

$$= 7968 \text{ ft-lb}$$

Rebar provided

$$p = \frac{A_s}{bd}$$

$$= \frac{(0.31 \text{ in}^2)(4)}{(48 \text{ in})(5 \text{ in})}$$

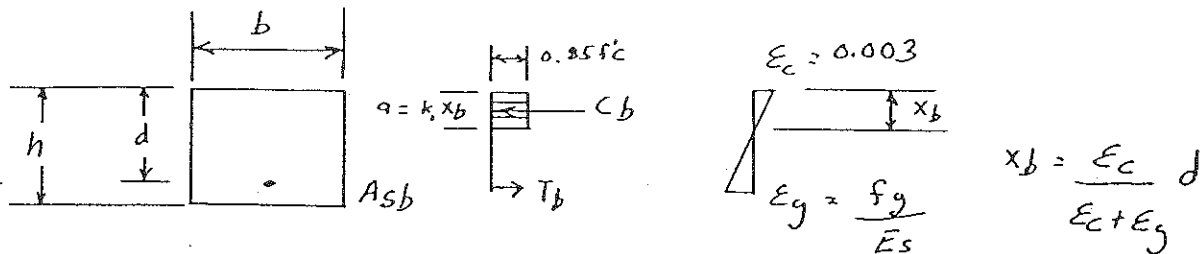
$$= 0.005$$

$$0.005 < 0.027 (.75 p_b) \quad \text{OK} \quad \text{See Sheet 3}$$



## Concrete Design - Ultimate Strength Method

Given  $f'_c = 3500 \text{ psi}$   $f_y = 60,000 \text{ psi}$   $k_1 = 0.85$  if  $f'_c \leq 4000 \text{ psi}$



$$C_b = 0.85 f'_c b k_1 x_b$$

$$T_b = A_{sb} f_y = \rho_b b d f_y$$

$$C_b = T_b$$

$$= 0.85 f'_c b k_1 \left( \frac{87,000 d}{87,000 + 60,000} \right)$$

$$= \rho_b b d f_y$$

$$\text{Balance Ratio } \rho_b = \frac{0.85 f'_c k_1}{f_y} \left( \frac{87,000}{87,000 + f_y} \right)$$

$$= \frac{0.85 (3500) (0.85)}{40,000} \left( \frac{87,000}{87,000 + 60,000} \right)$$

$$= 0.037$$

ACI code limits tension reinforcement to 75% of the balanced ratio

$$0.75 \rho_b = (0.75) (0.037)$$

$$= 0.027$$



Ultimate Strength Available

$$T = A_s f_y$$

$$= \frac{0.31 \text{ in}^2}{ft} \times 4ft \times 60,000 \text{ psi}$$

$$= 74,400 \text{ lbs}$$

$$a = \frac{T}{0.85 f'_c b}$$

$$= \frac{74,400 \text{ lbs}}{0.85 (3500 \text{ psi}) (48 \text{ in})}$$

$$= 0.52$$

$$M'_u = \frac{T (d - \frac{a}{2})}{12}$$

$$= \frac{74,400 \text{ lbs} (5 - \frac{0.52}{2})}{12}$$

$$= 14,694 \text{ ft-lb}$$

$$M'_u \text{ available} > M_u \text{ required}$$

$$14,694 \text{ ft-lb} > 7968 \text{ ft-lb} \quad \text{OK}$$



# Slab Shear Calculations

2 Way Shear

$$V_u = P_{net} (area) = 1.5 [(4 \times 4) - (1.08 \times 1.08)]$$

$$= 22.25 \text{ Kips}$$

$$v_u = \frac{V_u}{bd} = \frac{22,250}{4(18+8)(8)}$$

$$= 26 \text{ psi}$$

$$\text{Allowable } v_{uc} = 4 \phi \sqrt{f'_c}$$

$$= 4 (0.85) \sqrt{3500}$$

$$= 201 \text{ psi} > 26 \text{ psi OK}$$

1 Way Shear

$$V_u = 1.5 (0.92')(4.0')$$

$$= 5.52 \text{ Kips}$$

$$v_u = \frac{V_u}{bd} = \frac{5,520}{(4)(12)(8)}$$

$$= 14.4 \text{ psi}$$

$$\text{Allow } v_{uc} = 2 \phi \sqrt{f'_c}$$

$$= 2 (0.85) \sqrt{3500}$$

$$= 100.5 \text{ psi} > 14.4 \text{ psi OK}$$



## **Sidewall & Bottom Structure and Corrosion Calculations**



for Cylindrical Shell (Long Seam)

$$\begin{aligned}
 \text{wall thickness required} &= \frac{PR}{SE + 0.4P} \\
 &= \frac{(13.9)(72)}{(17,500)(0.70) + 0.4(13.9)} \\
 &= 0.082 \text{ inches}
 \end{aligned}$$

for Torispherical Head

$$\text{when } L/r = 16^{2/3}$$

$$\begin{aligned}
 t &= \frac{0.885 P L}{SE + 0.8P} \\
 &= \frac{0.885 (13.9)(144)}{(17,500)(0.70) + 0.8(13.9)} \\
 &= 0.145 \text{ inches}
 \end{aligned}$$

∴ for 1/4" thick tank wall

$$0.25" - 0.145"$$

= 0.105 inches of material  
available for erosion or corrosion



## Storage Vessel Design - TANK FARM

(P) Pressure at bottom of vessel

Assume specific gravity = 2.0

Vessel  $\phi$  = 12 ft

Vessel straight wall = 14 ft

Height of Dish = 2 ft

$$\begin{aligned}
 P &= (2.0)(14' + 2')(62.4 \text{ lbs/ft}^3) \\
 &= 1996 \text{ lbs/ft}^2 \\
 &= 13.9 \text{ psi}
 \end{aligned}$$

Per Pressure Vessel Handbook by Eugene Megyesy

Assume

(E) joint efficiency = 0.70

(S) design stress = 17,500 psi

(P) design pressure = 13.9 psi

(R) tank radius = 72 inches

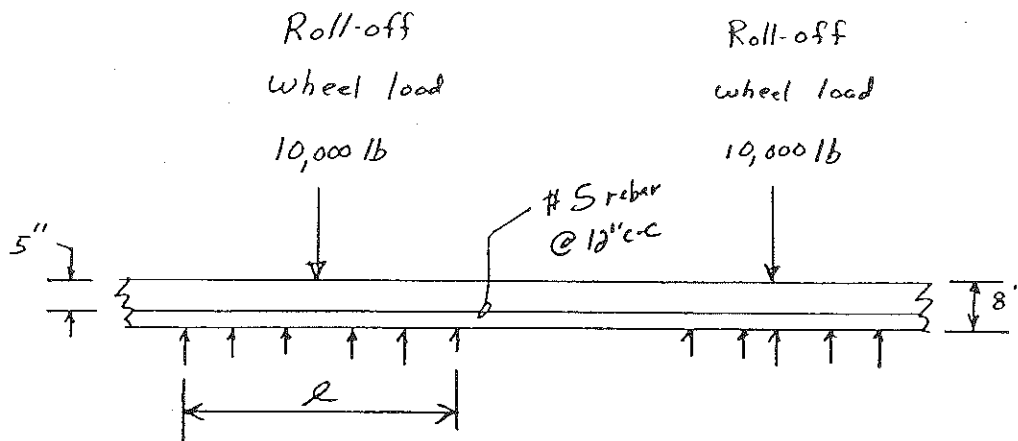
(L) dish arc radius = 144 inches



## **Structural Loading Calculations**



## Roll-off Area Concrete Design



Assume

max Roll-off wheel load = 10,000 lb

Concrete thickness = 8 inch

No 5 rebar @ 12" c-c (0.31 in<sup>2</sup>)

Soil pressure capability = 1500 psf

Loading carried by 2 ft wide strip

$$10,000 \text{ lbs} = 2 \text{ ft} (L) (1500 \text{ psf})$$

$$L_{\text{req'd}} = 3.33 \text{ ft}$$

Max moment below wheel

$$M = (1500 \text{ psf}) (2 \text{ ft}) \left( \frac{3.33 \text{ ft}}{2} \right) \left( \frac{3.33 \text{ ft}}{4} \right)$$

$$= 4158 \text{ ft} \cdot \#$$

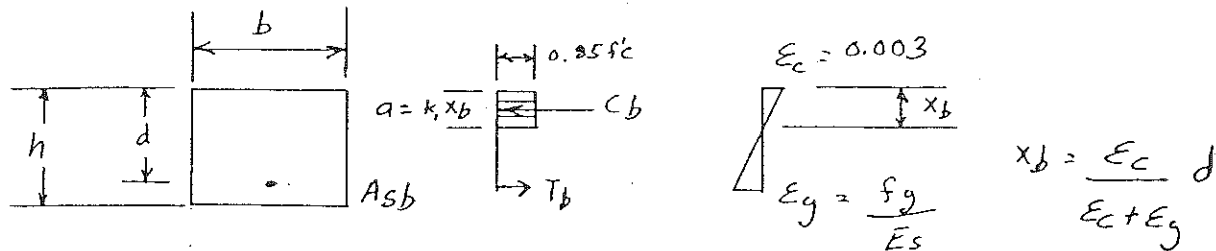
$$M_{\text{ultimate}} = 4158 \text{ ft} \cdot \# \times 1.7 \text{ (Safety factor)}$$

$$= 7,068 \text{ ft} \cdot \#$$



## Concrete Design - Ultimate Strength Method

Given  $f'_c = 3500 \text{ psi}$   $f_y = 60,000 \text{ psi}$   $k_1 = 0.85$  if  $f'_c \leq 4000 \text{ psi}$



$$C_b = 0.85 f'_c b k_1 x_b$$

$$T_b = A_{sb} f_y = \rho_b b d f_y$$

$$C_b = T_b$$

$$= 0.85 f'_c b k_1 \left( \frac{87,000 d}{87,000 + 60,000} \right)$$

$$= \rho_b b d f_y$$

$$\text{Balance Ratio } \rho_b = \frac{0.85 f'_c k_1}{f_y} \left( \frac{87,000}{87,000 + f_y} \right)$$

$$= \frac{0.85 (3500) (0.85)}{40,000} \left( \frac{87,000}{87,000 + 60,000} \right)$$

$$= 0.037$$

ACI code limits tension reinforcement  
to 75% of the balanced ratio

$$= 0.75 \rho_b = (0.75) (0.037)$$

$$= 0.027$$



Rebar provided

$$\begin{aligned} p &= \frac{A_s}{bd} \\ &= \frac{(0.31)(2)}{(24)(5)} \\ &= 0.005 \end{aligned}$$

$$0.005 < 0.027 (175 p_b) \quad \text{OK}$$

Ultimate Strength Available

$$\begin{aligned} T &= A_s f_y \\ &= 0.31 \frac{\text{in}^2}{\text{ft}} \times 2 \text{ ft} \times 60,000 \text{ psi} \\ &= 37,200 \text{ lbs} \end{aligned}$$

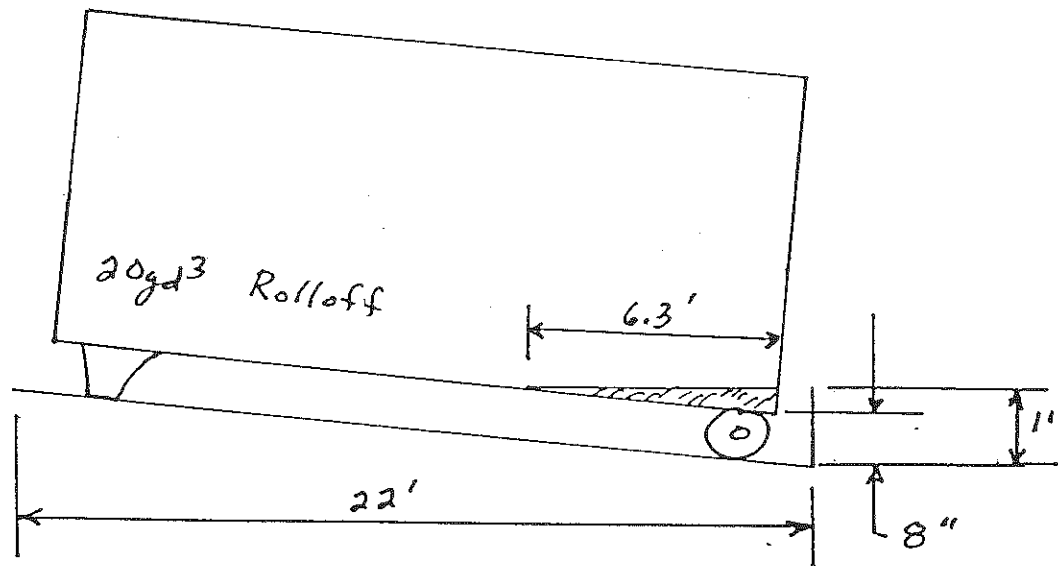
$$\begin{aligned} a &= \frac{T}{0.85 f'_c b} \\ &= \frac{37,200}{0.85 (3500) (24)} \\ &= 0.52 \end{aligned}$$

$$\begin{aligned} M'_u &= \frac{T (d - \frac{a}{2})}{12} \\ &= \frac{37,200 \text{ lbs} (5 - \frac{0.52}{2})}{12} \\ &= 14,694 \text{ ft-lb} \end{aligned}$$

$$M'_u \text{ available} > M_u \text{ required} \quad \text{OK}$$

$$14,694 \text{ ft-lb} > 7,068 \text{ ft-lb}$$





### Assumptions

- 1) 60' x 22' containment area
- 2) 1 ft high berm wall for end
- 3) floor slope front to back
- 4) 6 Rolloffs stored in containment area
- 5) Rolloffs have 8 inches of floor clearance

### Secondary Containment

60' x 22' Sloped floor with 1 ft vertical drop  
(Immersion of rolloffs)

$$V = \frac{1}{2}(60')(22')(1') - 6 \left[ \frac{1}{2}(6.3')(7.3')\left(\frac{4}{12}\right)' \right]$$

$$= 660 \text{ ft}^3 - 46 \text{ ft}^3$$

$$= 614 \text{ ft}^3 \times \frac{1 \text{ yd}^3}{27 \text{ ft}^3}$$

$$= 22.7 \text{ yd}^3 > 20 \text{ yd}^3 \quad \text{OK}$$







**WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
CHAPTER NR 630 HAZARDOUS WASTE TREATMENT, STORAGE & DISPOSAL FACILITY STANDARDS  
RELICENSING REVIEW CHECKLIST**

Facility Name: Badger Disposal of WI., Inc.

Instructions: Reviewers may customize this form by creating additional cells with headings & requirement items applicable to a specific facility by using the table title bar.

TREATMENT, STORAGE & DISPOSAL FACILITY STANDARDS - CHAPTER NR 630		SUBMITTAL PAGE	*C	**A	COMMENTS
<b>EXEMPTIONS - S. NR 630.04</b>		2-1			
(1) - (15) Does the facility meet any exemption requirements outlined in this section?		2-1			
<b>ENVIRONMENTAL &amp; HEALTH STANDARDS - S. NR 630.05</b>		2-1			
(1)	Is the facility located, designed, constructed & operated in a manner to ensure a reasonable probability the management of hw will not have a detrimental effect on groundwater quality? OR	2-1			
	Is the facility located, designed, constructed & operated in a manner to ensure a reasonable probability the management of hw will not cause a violation of ch. NR 140 groundwater standards?	2-1			
(2)	Is the facility located, designed, constructed & operated in a manner allowing any surface or subsurface discharges from the facility to navigable waters to cause a violation of water quality standards in chs. NR 102 to 105, or violations of ss. 292.01 to 292.15, Stats.? OR	2-2			
	Is the facility located, designed, constructed & operated in a manner to ensure a reasonable probability that the management of hw will not have a detrimental effect on surface water quality?	2-2			
(3)	Is the facility located, designed, constructed & operated in a manner to prevent air emissions from the facility from causing a violation of standards in chs. NR 400 to 499?	2-2			
<b>REQUIRED NOTICES - S. NR630.10</b>		2-3			
(1)	Is the facility receiving waste from a foreign source?	2-3			
	If the facility is receiving waste from a foreign source, has the facility notified the department at least 4 weeks in advance of the facility receiving a shipment from a foreign source?	2-3			
(2)	Has there been a transfer of ownership/operations since the last licensing?	2-3			
	If there has been a transfer of ownership, has the owner/operator provided appropriate <b>written</b> notification to the new owner/operator of the requirements of ss. NR 600.04 & 620.15, & chs. NR 630 to 685?	2-3			
(3)	Has the owner/operator of a facility that receives waste from off-site provided <b>written</b> notification to the off-site generator that the receiving facility has the appropriate license for, & will accept, the waste	2-3			

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File located on W:drive at W:Hw/Relicensing/Checklists/NR630

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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the generator is shipping?				
Is a copy of this written notification kept as part of the operating record?	2-3			
<b>IDENTIFICATION NUMBERS - S. NR 630.11</b>	2-3			
Does the facility have an EPA identification number?	2-3			
Does the notification currently on-file reflect the current waste management activities at the facility?	2-3			
<b>GENERAL WASTE ANALYSIS - S. NR 630.12</b>	2-3 and Appendix D			
(1) Has a detailed chemical & physical analysis of a representative sample of waste been obtained from the generator prior to receipt of the waste at the TSD facility?	2-3 and Appendix D			
Does the analysis contain all information needed to treat, store or dispose the waste in accordance with chs. NR 600 to 685, or conditions of an interim license, variance or approved plan of operation?	2-3 and Appendix D			
(2) The analysis may include data developed either: _____ under chs. NR 605, 610 & 625, & existing published or documented data on the hw, OR _____ from wastes generated using similar processes.	2-3 and Appendix D			
(3) Is the analysis repeated to ensure the information is accurate & up to date?	2-3 and Appendix D			
(3)(a) Is the analysis repeated when the process or operation generating the waste has been changed?	2-3 and Appendix D			
(3)(b) Is the analysis repeated when the off-site facility finds the waste received does not match the waste designated on the accompanying manifest or shipping paper?	2-3 and Appendix D			
(4) Does the off-site facility inspect &, if necessary, analyze in accordance with the waste analysis plan required in s. NR 630.13, each hw shipment received to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper?	2-3 and Appendix D			
<b>WASTE ANALYSIS PLAN - S. NR 630.13</b>	2-3 and Appendix D			
(1) Has the owner/operator developed & implemented a <b>written</b> waste analysis plan describing procedures to be carried out in order to comply with the requirements of s. NR 630.12? Section (1) (a) through (h) outlines the minimum components of the waste analysis plan, as follows:	2-3 and Appendix D			
(1)(a) Does the plan include the parameters for which each hw will be analyzed?	2-3&Appendix D			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
Does the plan include the rationale for how the parameters were chosen?	2-3 and Appendix D			
Does the plan include an explanation as to why the parameters chosen are sufficient to adequately characterize the waste received per s. NR 630.12?	2-3 and Appendix D			
(1)(b) Does the plan include the test methods to be used for these parameters?	2-3 and Appendix D			
(1)(c) Does the plan include the sampling method used to obtain a representative sample of the waste to be analyzed, using either: 1. One of the methods described in Appendix 1, ch. NR 605? OR 2. An equivalent method, approved by the department?	2-3 and Appendix D			
(1)(d) Does the plan include the frequency of "reanalysis" or review of analytical information to ensure accuracy?	2-3 and Appendix D			
(1)(e) For waste from off-site facilities, does the plan include information regarding the waste analyses the generator has agreed to supply?	2-3 and Appendix D			
(1)(f) Does the plan include the methods used to meet additional requirements associated with 1. Ignitable/reactive wastes [s. NR 630.17(2)]? 2. Treatment in tanks [s. NR 645.06(3)(b)2.]? 3. Ignitable/reactive wastes in waste piles [s. NR 655.09]? 4. Landfill or surface impoundment standards [s. NR 660.13(5)&(7)]? 5. Incinerator standards [s. NR 665.09(15)]? 6. Miscellaneous unit standards [s. NR 670.11(2)(a)]?	2-3 and Appendix D			
(1)(g) For off-site facilities, does the waste analysis plan include the procedures to inspect &, if necessary, analyze each shipment to ensure the received waste matches the manifest/shipping paper description, including the following: 1. Procedure used to identify each waste shipment received at the facility? 2. Sampling method used to obtain a representative sample, if the procedure in item #1, above, includes sampling as an identifying tool? 3. Method used at a landfill to determine whether biodegradable sorbent has been added to containerized waste to be disposed?	2-3 and Appendix D			
(1)(h) Applies to surface impoundments, please see code for greater detail.	Not Applicable			
(2) Are chemical & physical analyses being performed by a lab certified or registered under ch. NR 149? Items excluded from this requirement are:	2-3 and Appendix D			

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Facility Name: or Disposal of WL, Inc.

Ch. NR 630 Hazardous Waste TSD Facility Stand

ecklist, Page 4

TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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physical tests of soils field conductivity leachate-liner compatibility testing	air quality tests turbidity tests	gas tests water elevation	field pH tests temperature				
(3) Are bacterial & radiological samples analyzed by the state lab of hygiene or at another lab approved or certified by the Department of Health & Family Services?	2-3 and Appendix D						
(4) Has the department required analyses from a lab which has not been certified, registered or approved by the Department of Health & Family Services?	2-3 and Appendix D						
<b>SECURITY - S. NR 630.14</b>	2-3						
(1) Has the owner/operator taken the necessary precautions to prevent the unknowing entry, & minimize the possibility for unauthorized entry of persons or livestock onto the active portion of the site?	2-3						
(1)(a) Can the owner/operator demonstrate measures have been taken to ensure physical contact with waste, structures or equipment within the active portion of the site by persons or livestock will not cause injury?	2-3						
(1)(b) Can the owner/operator demonstrate that measures have been taken to ensure that the disturbance of waste or equipment by the unauthorized entry of persons or livestock onto the active portion of the site will not result in violations of s. NR 600.04 & chs. NR 630 to 685?	2-3						
If the answers to (1), (1)(a) & (1)(b), above, are "yes," then the facility <u>may</u> be exempt from the additional security requirements outlined below. Is the facility exempt from the additional security requirements?	2-3						
(2)(a) Does the facility have 24-hour surveillance, such as TV monitoring, guards, or facility personnel, which continuously monitor & control access to the facility? OR	2-3						
(2)(b)1. Does the facility have a fence or other artificial barrier, which controls site access? AND	2-3						
(2)(b)2. Does the facility have gates, locked doors, controlled roadway access, attendant or TV monitors to control entry to the active portion of the site at all times?	2-3						
(3) Does the facility have a "Danger Unauthorized Personnel Keep Out" sign of appropriate size, number & placement? See code for more details.	2-3						
<b>GENERAL INSPECTION REQUIREMENTS - S. NR 630.15</b>	2-4 and Appendix E						
(1) Does the owner/operator inspect the facility for malfunctions & deteriorations of equipment, etc., which could lead to discharges of hw or hw constituents?	2-4 and Appendix E						
(1) Are the inspections performed with a frequency to allow for early detection & correction of potential	2-4 & Append. E						

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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problems?				
(2) Has the owner/operator developed & followed a <b>written</b> schedule for inspecting the following items to prevent, detect & respond to environmental or human health hazards? monitoring equipment                      safety & emergency equipment security devices                              operating & structural equipment (dikes, sump pumps, etc.)	2-4 and Appendix E			
(2)(b) Is the inspection schedule kept at the facility?	2-4 and Appendix E			
(2)(c) Does the schedule identify the types of problems to look for during the inspection?	2-4 and Appendix E			
(2)(d) Does the frequency of inspections for various items meet the frequencies minimally prescribed in ch. NR 630 - TSD facilities      ch. NR 640 - containers ch. NR 645 - tanks                  ch. NR 655 - waste piles & container buildings ch. NR 665 - incinerators        ch. NR 670 - miscellaneous units ch. NR 660 - landfills & surface impoundments	2-4 and Appendix E			
(3) Does the owner/operator remedy problems noted in a timely fashion?	2-4 and Appendix E			
(4) Does the owner/operator keep a <b>written</b> log or summary of inspections for a minimum of 3 years from the date of the inspection?	2-4 and Appendix E			
Does the inspection log include the following: Date & time of inspection?      Notes regarding observations made? Name of inspector?                Date & nature of repairs made/remedial actions taken?	2-4 and Appendix E			
<b>PERSONNEL TRAINING - S. NR 630.16</b> (Referenced from s. NR 680.06(3)(j))	2-4 and Appendix F			
(1) Does the facility provide on-the-job training to its employees to ensure the facility is operated in compliance with s. NR 600.04 & chs. NR 630 to 685?	2-4 and Appendix F			
(1)(a) Has the person directing the training been trained in hw management procedures?	2-4 and Appendix F			
Does the training include the following for appropriate employees: hw management procedures & contingency plan implementation?	2-4 and Appendix F			
(1)(b) Does the training provide adequate information to allow employees to respond effectively to emergencies?	2-4 and Appendix F			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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Does the training familiarize employees with emergency procedures? emergency equipment? emergency systems, including procedures for using, inspecting, repairing & replacing: 1. Facility emergency & monitoring equipment 2. Automatic feed cut-off systems 3. Communications &/or alarm systems 4. Response to fire &/or explosions 5. Response to groundwater contamination incidents 6. Shutdown of operations	2-4 and Appendix F			
(2) Are new employees trained as described in items outlined in (1), above, within 6 months of being placed in a position requiring the outlined training?	2-4 and Appendix F			
Have new employees been allowed to work in unsupervised positions prior to having received the training outlined above?	2-4 and Appendix F			
(3) Have employees participated in an annual review of the items outlined in (1), above?	2-4 and Appendix F			
(4) Does the owner/operator maintain the records outlined in (4)(a) through (4)(d), below, at the facility?	2-4 and Appendix F			
(4)(a) Are there records, which include the job title for each position, related to hw management?	2-4 and Appendix F			
Are there records containing the name(s) of the employee(s) filling each job related to hw management?	2-4 and Appendix F			
(4)(b) Is there a <b>written</b> job description for each position listed under (4)(a), above?	2-4 and Appendix F			
Does the written job description include both the requisite skill, education or other qualifications & the duties of facility personnel assigned to each position?	2-4 and Appendix F			
(4)(c) Is there a <b>written</b> description of the amount & type of introductory & continuing training that will be provided to each person filling positions listed in (4)(a)?	2-4 and Appendix F			
(4)(d) Are there records that document the appropriate training has been given to, & completed by, the appropriate facility personnel?	2-4 and Appendix F			
(5) Are training records of former employees kept at the facility at least 3 years from the date the employee last worked at the facility?	2-4 and Appendix F			

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Facility Name: Mer Disposal of WI., Inc.

TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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Are training records of current personnel being kept [until the facility closes]?	2-4 and Appendix F			
Have training records been transferred with personnel who have transferred within the company?	2-4 and Appendix F			
<b>GENERAL REQUIREMENTS FOR IGNITIBLE, REACTIVE OR INCOMPATIBLE WASTES - S. NR 630.17</b>	2-4			
(1) Has the owner/operator taken precautions to prevent accidental ignition or reaction of ignitable or reactive waste? Precautions include, but are not limited to, separation from: open flames      smoking      cutting/welding      hot surfaces frictional heat      sparks      radiant heat      spontaneous ignition	2-4			
Are "No Smoking" signs posted in areas where ignitable or reactive wastes are managed?	2-4			
(2)(a) Is the treatment, storage or disposal of ignitable or reactive waste & the commingling of incompatible wastes conducted to ensure the following will not be generated: extreme heat or pressure, fire or explosion, or violent reaction?	2-4			
(2)(b) Is the treatment, storage or disposal of ignitable or reactive waste & the commingling of incompatible wastes conducted to ensure the following will not be produced in quantities to threaten human health & the environment: uncontrolled toxic mists, fumes, dust, &/or gases?	2-4			
(2)(c) Is the treatment, storage or disposal of ignitable or reactive waste & the commingling of incompatible wastes conducted to ensure the following will not be produced in quantities to pose a risk of fire or explosion: uncontrollable gases or fumes?	2-4			
(2)(d) Is the treatment, storage or disposal of ignitable or reactive waste & the commingling of incompatible wastes conducted to ensure the structural integrity of the device or facility containing the waste will not be damaged?	2-4			
(2)(e) Is the treatment, storage or disposal of ignitable or reactive waste & the commingling of incompatible wastes conducted to ensure that human health & the environment are not threatened?	2-4			
(3) Has the owner/operator documented its ability to comply with (1) & (2), above? This documentation can include bench scale tests, engineering studies, waste analyses, etc.	2-4			
<b>LOCATIONAL STANDARDS - S. NR 630.18</b>	2-5			
(1) Is the facility located in a floodplain?	2-6			
(2) Is the facility located in a wetland?	2-6			

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Facility Name: Per Disposal of WL, Inc.

Ch. NR 630 Hazardous Waste TSD Facility Standards

Checklist, Page 8

TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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(3)	Is the facility located in a habitat considered critical to the continued existence of an endangered species (listed in ch. NR 27)?	2-6			
(4)	Is the department requiring the active portion of the facility to be located up to 200 feet from the property boundary?	Not Applicable			
	If so, is information provided that this requirement is being met?	2-7			
	Is the active portion of the site at least 50 feet from the property boundary?	2-7			
(5)	Is the portion of a new facility where treatment, storage or disposal of hazardous waste will be conducted located at least 200 feet from a fault which had displacement in Holocene time?	Not Applicable			
	<b>ADDITIONAL FACILITY STANDARDS - S. NR 630.20</b>	2-7			
(1)	Are the special conditions for the detonation & open burning of explosives being implemented? SITE SPECIFIC - refer to code for more information.	2-7			
(2)	Are facilities with "point discharges," such as discharges from leachate collection systems & surface water run-off collection systems, in compliance with all applicable portions of ch. 283, Stats.?	2-7			
	Are facilities with discharges to municipal sewer systems meeting pretreatment standards & have the approval from the municipal treatment system for the discharge?	Not Applicable			
(3)	Is surface water run-on diverted away from the active portion of the facility?	2-7			
	Are dikes, etc., designed, constructed & maintained to contain run-on from a 24-hour, 25-year storm?	2-7			
(3)(b)	Is all surface water run-off from the active portion of the facility collected & contained to a point source before discharge or treatment, as may be required under ch. 283, Stats.?	2-7			
	Is the collection area designed, constructed, & operated to collect run-off from a 24-hour, 25-year storm?	2-7			
(4)	Does the facility generate hazardous waste?	2-8			
	Does the facility comply with the applicable hw generator requirements?	2-8			
(5)	Has the owner/operator closed noncomplying portions of the facility in accordance with s. NR 685.05?	2-8			
(6)	Is the owner/operator in compliance with applicable requirements of state water quality requirements/management plans per ch. 283, Stats.?	2-8			
(7)	Are there nonpoint discharges of hw into navigable waters of the state?	2-8			

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Facility Name: Wager Disposal of WI., Inc.

TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630				SUBMITTAL PAGE	*C	**A	COMMENTS
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	Are the nonpoint discharges causing or contributing to violations of water quality standards specified in chs. NR 102 through 104?	2-8			
(8)	Is there the potential for discharge of hw or hw constituents to the environment from the storage or treatment facility?	2-8			
	Has the Department used the authority provided in s. NR 600.07 to require compliance with s. NR 600.04, & chs. NR 630 to 685, including the groundwater & leachate monitoring requirements of ch. NR 635?	2-8			
<b>PREPAREDNESS &amp; PREVENTION - S. NR 630.21</b>		2-9			
(1)	Is the facility designed, constructed, maintained & operated to minimize the possibility of fire, explosion or other sudden or nonsudden discharge of hazardous waste or hazardous constituents to air, land, or surface waters which could be harmful to human health &/or the environment?	2-9			
(2)	Unless the facility is able to demonstrate any of the following items are not necessary, the facility must be equipped with the following equipment:	2-9			
(2)(a)	Does the facility have a communication system (telephone, 2 way radio, alarm, etc.) able to summon emergency assistance from fire or police departments, or state or local emergency response teams?	2-9 and Appendix H			
(2)(b)	Does the facility have an internal communications system to alert facility personnel?	2-9 and Appendix H			
(2)(c)	Does the facility have portable fire extinguishers?	2-10 and Appendix H			
	Does the facility have fire control equipment?	2-10 and Appendix H			
	Does the facility have special extinguishing agents/equipment?	2-10 and Appendix H			
	Does the facility have spill control equipment?	2-10 and Appendix H			
	Does the facility have decontamination equipment applicable to the type(s) of waste(s) handled at the facility?	2-10 and Appendix H			
(2)(d)	Does the facility have extinguishing agents of adequate volume & adequate delivery systems?	2-10 and Appendix H			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630		SUBMITTAL PAGE	*C	**A	COMMENTS
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(3)	Do employees have immediate access to internal/external emergency communication devices in those areas of the facility where waste is being handled?	2-10 and Appendix H			
(4)	Are the communication &/or alarm systems tested & maintained to ensure proper operation in an emergency?	2-10 and Appendix H			
	Is the fire protection equipment tested & maintained to ensure proper operation in an emergency?	2-10 and Appendix H			
	Is the spill control equipment tested & maintained to ensure proper operation in an emergency?	2-10 and Appendix H			
	Is the decontamination equipment tested & maintained to ensure proper operation in an emergency?	2-10 and Appendix H			
(5)	Is adequate aisle space maintained to allow unobstructed movement of personnel & emergency response equipment?	2-10			
(6)	Has the facility made arrangements with fire & police departments, & emergency response teams?	2-11 and Appendix I			
(6)(a)	Have fire & police departments & emergency response teams been familiarized with facility layout?	2-11 and Appendix I			
	Have fire & police departments & emergency response teams been familiarized with the properties & associated hazards of the wastes handled at the facility?	2-11 and Appendix I			
	Have fire & police departments & emergency response teams been familiarized with the locations of personnel work areas & waste management locations?	2-11 and Appendix I			
	Have fire & police departments & emergency response teams been familiarized with roads & evacuation routes associated with the facility?	2-11 and Appendix I			
(6)(b)	In the event more than one emergency service provider is available, have agreements been made to establish primary & secondary responders?	2-11 and Appendix I			
(6)(c)	Have agreements been made with state emergency response teams, emergency response contractors & equipment suppliers?	2-11 and Appendix I			
(6)(d)	Have local hospitals been made aware of the properties of the wastes handled at the facility, & the	2-11 & Append. I			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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types of illnesses or injuries, which could result from fires, explosions or discharges from the facility?				
<b>CONTINGENCY PLAN &amp; EMERGENCY PROCEDURES - S. NR 630.22</b>	<i>2-11 and Appendix I</i>			
(1)(a) Has the facility developed a contingency plan, which describes the procedures to be used to minimize the impact to human health or the environment in the event of a fire, explosion or discharge of hazardous waste or hazardous constituents?	<i>2-11 and Appendix I</i>			
(1)(b)1. Are copies of the contingency plan & all revisions kept at the facility office?	<i>2-11 and Appendix I</i>			
(1)(b)2. Are copies of the contingency plan & all revisions sent to all police & fire departments, hospitals & emergency responders?	<i>2-11 and Appendix I</i>			
(1)(b)3. Are copies of the contingency plan & all revisions filed with the DNR?	<i>2-11 and Appendix I</i>			
(1)(c) Is the plan reviewed & amended, as necessary, whenever the facility operating license, interim license, variance or waiver is amended?	<i>2-11 and Appendix I</i>			
(1)(c)2. Is the plan reviewed & amended, as necessary, whenever the contingency plan fails in an emergency?	<i>2-11 and Appendix I</i>			
(1)(c)3. Is the plan reviewed & amended, as necessary, whenever the facility changes in its design, construction, operation, maintenance or other circumstances which materially increases the potential for fire, explosion, or discharge of hazardous waste or hazardous constituents, or changes the response in the event of an emergency?	<i>2-11 and Appendix I</i>			
(1)(c)4. Is the plan reviewed & amended, as necessary, whenever the list of emergency coordinators changes?	<i>2-11 and Appendix I</i>			
(1)(c)5. Is the plan reviewed & amended, as necessary, whenever the list of emergency equipment changes?	<i>2-11 and Appendix I</i>			
(1)(d) Is there at least one person per operating shift with the responsibility of coordinating all emergency response measures?	<i>2-11 and Appendix I</i>			
Is there an emergency coordinator that is on call when the facility is not in operation?	<i>2-11 and Appendix I</i>			
Has the emergency coordinator been given the authority to commit the resources necessary to respond to an emergency situation?	<i>2-11 and Appendix I</i>			

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Facility Name ger Disposal of WL, Inc.

Ch. NR 630 Hazardous Waste TSD Facility Standard

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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(1)(e)1. For all persons acting as facility emergency response coordinator, does the contingency plan contain, at a minimum, the following---	2-11 and Appendix I			
name address, both home & office	position telephone number, both home & work			
(1)(e)2. Does the contingency plan contain, at a minimum, a description of facility layout?	2-11 and Appendix I			
Does the contingency plan contain, at a minimum, types of wastes & their location within the facility?	2-11 and Appendix I			
Does the contingency plan contain, at a minimum, roads in & around the facility?	2-11 and Appendix I			
Does the contingency plan contain, at a minimum, areas of the facility where personnel will be working?	2-11 and Appendix I			
(1)(e)3. Does the contingency plan contain, at a minimum, an evacuation plan, including appropriate alarm signals & alternative evacuation routes?	2-11 and Appendix I			
(1)(e)4. Does the contingency plan contain, at a minimum, procedures for an emergency shutdown?	2-11 and Appendix I			
(1)(e)5. Does the contingency plan contain, at a minimum, the procedure to notify local authorities of hazardous waste discharges, fire or explosion?	2-11 and Appendix I			
(1)(e)6. Does the contingency plan contain, at a minimum, a list of all emergency equipment, including location within the facility, physical description & capabilities of the equipment listed?	2-11 and Appendix I			
(1)(e)7. Does the contingency plan contain, at a minimum, a description of the arrangements made between the facility & emergency response service providers (police, fire, hospital, haz. mat. teams, etc.)?	2-11 and Appendix I			
(1)(f) Are facility employees familiar with all emergency procedures, equipment & systems?	2-11 and Appendix I			
(1)(g) Has the owner/operator prepared a Spill Prevention, Control & Countermeasures (SPCC) plan? If so, it may be modified to include hazardous waste management provision per s. NR 600.04 & chs. NR 630 through 685 in lieu of creating a contingency plan.	2-11 and Appendix I			
(2)(a) Emergency Procedures - there are prescribed activities which are to be implemented in the event the facility has, or there is an imminent threat that the facility may have, a hazardous waste discharge, fire explosion, or other emergency which may threaten human health & the environment. In these situations...	2-11 and Appendix I			

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Facility Name: ger Disposal of WL, Inc.

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(2)(a)1. Are provisions made that the emergency coordinator activates alarms to notify all personnel of the emergency situation?	2-11 and Appendix I			
(2)(a)2. Are provisions made that the emergency coordinator telephone the division of emergency government, and comply with the requirements of s. 292.11, stats., (Hazardous Substance Discharge), and ch. NR 706 Wis. Adm. Code, (Hazardous Substance Discharge Notification and Source Confirmation Requirements).	2-11 and Appendix I			
(2)(a)3. Are provisions made that the emergency coordinator immediately identifies the character, source, amount & aerial extent of any discharged materials?	2-11 and Appendix I			
(2)(a)4. Are provisions made that the emergency coordinator assess possible direct & indirect hazards to human health & the environment which may result from the discharge/fire/explosion &/or the materials used to address the releases?	2-11 and Appendix I			
(2)(a)5. Are provision made that the emergency coordinator immediately notify proper authorities if the assessment of the situation could lead to a release outside the facility or to an evacuation. The emergency coordinator must notify either the division of emergency government or the national response center with the following information: a. Name & telephone number of person reporting b. Facility name & address c. Name & type of incident d. Name & quantity of materials involved, to the extent known e. The extent of injuries, if any f. The possible hazards to human health & the environment outside the facility	2-11 and Appendix I			
(2)(a)6. Are provisions made that the emergency coordinator take reasonable precautions to ensure discharges/fires/explosions do not occur, recur, or spread to other hazardous wastes at the facility?	2-11 and Appendix I			
(2)(a)7. Are provisions made that the emergency coordinator monitors for leaks, pressure build-ups, etc., if the facility ceases operation in response to discharges/fires/explosions?	2-11 and Appendix I			
(2)(a)8. Are provisions made that the emergency coordinator provide for appropriate management of waste &/or contaminated media resulting from the release & the response to the release?	2-11 and Appendix I			
(2)(a)9. Are provisions made that the emergency coordinator ensure that incompatible wastes do not contact the release area until the release area has been cleaned, & emergency equipment is cleaned & ready for use prior to operation restart?	2-11 and Appendix I			
(2)(b) Are provision made that the owner/operator notifies DNR & appropriate local authorities that the release area & emergency equipment has been cleaned before operations at the facility are resumed?	2-11 and Appendix I			
(2)(c) Are provisions made that the owner/operator keep details of the incident in the operating log?	2-11 & Append. I			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENT
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Are provisions made that the owner/operator file a report about the incident with DNR within 15 days of the incident?	2-11 and Appendix I			
(2)(c)1. Does the incident report contain the name, address, & phone number of the owner/operator?	2-11 and Appendix I			
(2)(c)2. Does the incident report contain the name, address, & phone number of the facility?	2-11 and Appendix I			
(2)(c)3. Does the incident report contain the date, time & type of incident?	2-11 and Appendix I			
(2)(c)4. Does the incident report contain the name & quantities of materials involved?	2-11 and Appendix I			
(2)(c)5. Does the incident report contain the extent of injuries, if any?	2-11 and Appendix I			
(2)(c)6. Does the incident report contain an assessment of potential or actual hazards to human health & the environment?	2-11 and Appendix I			
(2)(c)7. Does the incident report contain the estimated quantity & disposition of recovered materials?	2-11 and Appendix I			
(2)(c)8. Does the incident report contain a narrative describing known or suspected causes of the incident, & measures being taken to prevent future incidents?	2-11 and Appendix I			
(2)(c)9. Are any amendments to the contingency plan necessary based upon its effectiveness during an emergency?	2-11 and Appendix I			
<b>MANIFEST REQUIREMENTS - S. NR 630.30</b>	2-11			
(1) Does the operator comply with manifest regulations, including requiring the generator to initiate a WI manifest when appropriate?	2-11			
(2) Does the facility ensure the following before accepting manifested waste at the facility:	2-11			
(2)(a) Does the facility ensure the manifest is complete before accepting manifested waste at the facility?	2-11			
(2)(b) Does the facility ensure each container &/or portable tank is properly marked & labeled before accepting manifested waste at the facility?	2-11			
(2)(c) Does the facility ensure the markings & labels are consistent with the manifest before accepting manifested waste at the facility?	2-11			

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Ch. NR 630 Hazardous Waste TSD Facility Standard

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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(3) Does the facility accept waste it is not authorized to accept?	2-11			
(4)(a) When waste received is accompanied by a manifest, does the owner/operator sign & date each manifest copy to certify the manifested waste has been received?	2-12			
(4)(b) When waste received is accompanied by a manifest, does the owner/operator note any significant discrepancies?	2-12			
(4)(c) When waste received is accompanied by a manifest, does the owner/operator give the transporter at least one copy of the signed manifest?	2-12			
(4)(d) When waste received is accompanied by a manifest, does the owner/operator send the generator a signed copy of the manifest within 30 days of waste receipt?	2-12			
(4)(e) When waste received is accompanied by a manifest, does the owner/operator retain a signed copy of the manifest at the facility for a minimum of 3 years?	2-12			
(4)(f) When waste received is accompanied by a manifest, does the owner/operator send a copy of the properly completed & signed manifest to the DNR within 5 days, & submit the appropriate accumulative fees for each manifest submitted?	2-12			
(5) Does the facility receive waste by a rail or water bulk shipment transporter? If yes, please see additional requirements in s. NR 630.30(5).	2-12			
(6) Have appropriate steps been taken to address significant discrepancies?	2-12			
(7) Does the facility comply with applicable generator requirements if the facility initiates an off-site hw shipment?	2-12			
<b>RECORDKEEPING - S. NR 630.31</b>	2-12			
(1) Does the facility maintain an operating record for the life of the facility?	2-12			
(1)(a) Does the operating record contain the common name of the waste, hazardous waste number, physical form & quantity of the waste handled?	2-12			
(1)(b) Does the operating record contain the method & date of the wastes' treatment, storage or disposal at the facility?	2-12			
(1)(c) Does the operating record contain the location of waste within the facility?	2-13			
(1)(d) Does the operating record contain the records & results of any waste analyses performed?	2-13			
(1)(e) Does the operating record contain summary reports & details of any incidents, which required	2-13			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630		SUBMITTAL PAGE	*C	**A	COMMENTS
implementation of the contingency plan or emergency procedures?					
(1)(f)	Does the operating record contain records & results of inspections (kept for only 3 years)?	2-13			
(1)(g)	Does the operating record contain for off-site facilities, the generator notification in s. NR630.10(3)?	2-13			
(1)(h)	Does the operating record contain monitoring, testing or analytical data & corrective action information where required in: ss. NR 640.06 & 640.13(3) - container standards s. NR 655.08 - waste pile & container building standards s. NR 660.14 - landfill & surface impoundments standards s. NR 665.09(10) - incinerator standards ch. NR 635 - groundwater, leachate monitoring, & corrective action requirements ch. NR 645 - tank standards	2-13			
(1)(i)	Does the operating record contain closure (& long term care for disposal facilities) cost estimates per s. NR 685.07(2)?	2-13			
(1)(j)	Does the operating record contain the waste minimization certification per s. NR 630.32(1)?	2-13			
(1)(k)	Does the operating record contain records of the quantity & date of placement of waste in a land disposal unit? Records should include appropriate LDR extension information & generator LDR notifications.	Not Applicable			
(1)(l)	Does the operating record contain for off-site facilities, copies of LDR notices required from generators per s. NR 675.05?	Not Applicable			
(1)(m)	Does the operating record contain for an on-site treatment facility, the information contained in the required generator LDR notification, with the exception of the manifest number?	Not Applicable			
(1)(n)(o)	These items relate to on- or off-site disposal facilities, see code for more details.	Not Applicable			
(2)	Are records & plans kept at the facility & available for review?	2-13			
(3)	The DNR reserves the right to extend document retention times. If the DNR extended document retention times for this facility, is the facility in compliance with this requirement?	2-13			
(4)	Has the facility made provisions to provide records of waste disposal locations & quantities to the local municipality upon closure of the facility?	Not Applicable			
(5)	Is the identity & location of waste within the facility known at all times?	2-13			
WASTE MINIMIZATION - S. NR 630.32		2-13			

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TREATMENT, STORAGE AND DISPOSAL FACILITY STANDARDS - CHAPTER NR 630	SUBMITTAL PAGE	*C	**A	COMMENTS
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(1)	Does the facility maintain a waste minimization certification in the operating record?	2-13			
	Is the waste minimization certification signed by the owner/operator?	2-13			
	Is the waste minimization certification updated annually, at a minimum?	2-13			
	Does the waste minimization certification state there is a program in place to reduce the volume & toxicity of hw generated, to the extent economically practicable?	2-13			
	Does the waste minimization certification state the proposed method of treatment, storage or disposal is the practicable method currently available to the owner/operator which minimizes the present & future threat to human health & the environment?	2-13			
(2)	Does the facility treat, store or dispose of hw on-site?	2-13			
	If the facility treats, stores or disposes of hw on-site, has an annual hw activity report been filed with the Department [per NR630.40(1)]?	2-13			
(2)(a)	Does the annual report include a description of the effort(s) undertaken during the calendar year to reduce the volume & toxicity of hw generated?	2-13			
(2)(b)	Does the annual report include a description of the changes in volume & toxicity of hw actually achieved in comparison to previous years?	2-13			
<b>REPORTING - S. NR 630.40</b>		2-14			
(1)	Has the owner/operator prepared & submitted (by March 1) the annual hw activity reports as required?	2-14			
(1)(a)	Does the annual report contain the identification number, name & address of the facility?	2-14			
(1)(b)	Does the annual report identify the calendar year covered by the report?	2-14			
(1)(c)	If the facility receives waste from off-site, does the report contain the identification number of each hw generator from which hw was received during the calendar year?	2-14			
	If the facility receives waste from foreign sources, does the annual report include the name & address of the foreign generator?	2-14			
(1)(d)	Does the annual report contain a description & quantity of each hw received during the calendar year?	2-14			
	If the facility receives waste from off-site, is the description & quantity of each hw received during the calendar year listed by the identification number of the generator?	2-14			
(1)(e)	Does the annual report include the method of treatment, storage or disposal for each hw?	2-14			

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(1)(f)	Does the annual report include the most recent closure, & for disposal facilities, the most recent long term care estimates [per NR 685.07(2)]?	2-14			
(1)(g)	Does the report include a waste minimization report [per NR 630.32(2)]?	2-14			
(1)(h)	Does the annual report contain a certification statement, signed by the owner/operator, attesting to the accuracy of the report? This section contains specific language for the certification statement.	2-14			
(2)	Has the facility received hw from an off-site source without the accompanying manifest or shipping paper, as appropriate?	2-14			
	If the facility has received hw from an off-site source without the accompanying manifest or shipping paper, as appropriate, has a report been sent to the Department within 15 days of receiving the waste?	2-14			
(2)(a)	If the facility must report the receipt of hw from an off-site source without the accompanying manifest or shipping paper, as appropriate, does the report include the identification number, name & address of the facility?	2-14			
(2)(b)	Does the report contain the date the facility received the waste?	2-14			
(2)(c)	Does the report contain the identification number, name & address of the generator & transporter, if available?	2-14			
(2)(d)	Does the report include the date that the unmanifested hw was transported from the point of generation, if known?	2-14			
(2)(e)	Does the report contain a description of the waste, such as by waste code? AND	2-14			
(2)(f)	Does the report include the U.S. dot shipping name, hazard class & ID number, if known? AND	2-14			
(2)(g)	Does the report contain the quantity of each unmanifested hw received?	2-14			
(2)(h)	Does the report contain the method of treatment, storage or disposal for each hw?	2-14			
(2)(i)	Does the report include a brief explanation why the hw was unmanifested, if known?	2-14			
(2)(j)	Does the report include the name & address of the hw final destination?	2-14			
(2)(k)	Does the report include the certification statement, signed by the owner/operator or its authorized representative, as prescribed in this section? This section includes specific language for the certification statement.	2-14			
(3)(a)	Has the owner/operator reported discharges, fires & explosions per s. NR630.22(2)?	2-14			
(3)(b)	Has the owner/operator reported facility closures specified in s. NR685.05(10)(b)?	2-14			

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Facility Name ger Disposal of WI., Inc.

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(3)(c) Is the facility required to report information in connection with: ch. NR635 - groundwater & leachate monitoring, & corrective actions? ch. NR655 - waste pile & container buildings? ch. NR660 - landfills & surface impoundments?	2-14			
Has the Department imposed additional reporting requirements not addressed above?	2-14			
If the Department has imposed additional reporting requirements, is the facility in compliance with those additional requirements?	2-14			

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**WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
CHAPTER NR 640 HAZARDOUS WASTE CONTAINER STANDARDS  
RELICENSING REVIEW CHECKLIST**

Facility Name: **Badger Disposal of WI., Inc.** Revised September 15, 2006

Instructions: Reviewers may customize this form by creating additional cells with headings & requirement items applicable to a specific facility by using the table title bar.

CONTAINER STANDARDS - CHAPTER NR 640	SUBMITTAL PAGE	*C	**A	COMMENTS
<b>EXEMPTIONS - S. NR 640.04</b>				
(1) - (11) Does the facility meet any exemption requirements outlined in this section?	<i>Not Applicable</i>			
<b>FEASIBILITY &amp; PLAN OF PERATION REPORT - S. NR 640.06.</b> (Referenced from S. NR 680.06(4)(a))	<i>Section 3</i>			
(1) ALL FACILITIES. No person shall establish, construct or expand a hazardous waste storage or treatment facility without first obtaining written approval of a feasibility and plan of operation report from the department. The feasibility and plan of operation report shall be submitted in accordance with the requirements of ss. 289.23 and 289.30, Stats., and ss. NR 680.05(1), 680.06(3) and 680.10, and shall contain the applicable material required by this section. Additional report requirements for storage and treatment tanks are included in subs. (2) and (3). Feasibility and plan of operation report requirements for small storage container facilities, that meet the criteria in s. NR 640.07(1), are specified in s. NR 640.07(3).	<i>3-1</i>			
The feasibility and plan of operation report shall also contain the following information:				
(1)(a) A narrative describing:	<i>3-1</i>			
(1)(a)1. Legal description of the site.	<i>3-1</i>			
(1)(a)2. Present ownership of the site.	<i>3-1</i>			
(1)(a)3. Proposed site size and boundaries and present land use of the site and the area within a ½ mile of the site. Particular note shall be made of parks, hospitals, nursing homes, and areas of archaeological and historical significance.	<i>3-1</i>			
(1)(a)4. Area served, including population and major industries.	<i>3-1</i>			
(1)(a)5. A complete material balance for the facility, specifying the amounts and characteristics of the hazardous waste to be received and the amounts and characteristics of products and wastes which will be generated by the facility.	<i>3-3</i>			
(1)(a)6. Types of vehicles and access routes used to transport hazardous waste into and out of the site or facility, and	<i>3-5</i>			
an analysis of estimated traffic flow patterns on access routes and within the site or facility, and	<i>3-5</i>			

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## CONTAINER STANDARDS - CHAPTER NR 640

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an analysis of increased quantities of traffic on access routes into and out of the site or facility.				
If roads are to be used, current or proposed access roads and weight restrictions shall be included.	3-5			
(1)(a)7. Estimated quantities and characteristics of waste resulting from facility operations and methods of treatment and disposal.	3-7			
(1)(a)8. Person responsible for plant construction and operation.	3-7			
(1)(a)9. Quality and quantity of air discharge expected from plant operation.	3-7			
(1)(a)10. Appurtenances and procedures for the storage of hazardous waste beyond the end of the processing day, for the control of dust, odors, fire, windblown materials and potential explosion and for handling of hazardous waste in the case of major treatment facility breakdown.	3-8			
(1)(a) 11. Names and locations of all hazardous and solid waste disposal sites and facilities at which hazardous and solid waste from the treatment plant will be disposed.	3-9			
(1)(a)12. Overall site and facility layout including conceptual building design, sizing of receiving area, methods of processing, and sizing of major process equipment and process areas.	3-10			
(1)(a)13. A timetable for site or facility construction, startup and operation.	3-11			
(1)(a)14. Operating schedule.	3-11			
(1)(a)15. Provisions of protection of groundwater and surface waters during site or facility construction and operation.	3-11			
(1)(a)16. Conceptual design of equipment indicating its capacity and dimensions.	3-12			
(1)(a)17. The potential for the site to meet the location requirements in s NR 630.18.	3-12 and 2-5			
(1)(b) Regional Information. A discussion of the regional site setting to provide a basis for comparison and interpretation to site specific information obtained through field investigations and for analyzing siting and environmental considerations. Discussions should be limited to information available from publications, although some field verification and updating may be desirable. Discussions shall be supplemented by maps and cross-sections.	3-12			
The following items shall also be discussed.				
(1)(b)1. Topography, including predominant topographical features.	3-12			
(1)(b)2. Hydrology, including surface water drainage patterns and significant hydrologic features such as	3-14			

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surface water, springs, drainage basins and divides and wetlands.				
(1)(b)3. Geology, including nature and distribution of bedrock and unconsolidated deposits.	3-13			
(1)(b)4. Hydrogeology, including depth to groundwater, groundwater flow direction, recharge and discharge areas, groundwater divides, aquifers and identification of the aquifers use by public and private wells beneath the facility property and within one half mile of the proposed site, unless a demonstration is made to the department's satisfaction including why the information is not needed.	3-14			
(1)(b)5. Ground and surface water quality as described in available regional literature.	3-15			
(1)(b)6. Climatology.	3-15			
(1)(b)7. Identification of adjacent landowners.	3-16			
(1)(b)8. Zoning.	3-16			
(1)(b)9. Present land use with a particular emphasis on known recreational, historic or archeological areas.	3-16			
(1)(c) An existing and proposed site condition topographic plan. This shall be a detailed topographic survey of the facility area and all area within a 1500 feet of the facility. The minimum scale of this plan shall be one inch = 200 feet with a maximum 2-foot contour interval. The contour interval shall be sufficient to clearly show the pattern of the surface water flow in the vicinity of and form each operating unit of the facility. All elevations shall be related to USGS data. More than one plan sheet shall be prepared to show the required information if one sheet will be too detailed to be clear.	3-17 and Appendix P Sheet 3 of 18			
The plan or plans shall clearly show:				
(1)(c)1. 100-year floodplain area.	3-17 and Appendix P Sheet 7 of 18			
(1)(c)2. Surface waters, including wetlands and intermittent streams.	3-17 and Appendix P Sheet 7 of 18			
(1)(c)3. Homes, buildings, man-made features and utility lines.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)4. Surrounding land uses, such as recreational, commercial, agricultural, recreational and wooden	3-17 & Appen. P			

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areas.	Sheet 6 of 18			
(1)(c)5. Property boundaries, facility and waste management boundaries, including previous solid and hazardous waste disposal areas.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)6. Access control, such as fences and gates.	3-17 and Appendix P Sheet 2 of 18			
(1)(c)7. Water supply wells and any other wells, such as irrigation wells.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)8. Well boring locations and observation well locations.	N/A			
(1)(c)9. A wind rose, which shows prevailing wind speed and direction.	3-15 and Appendix Q, Figure 1			
(1)(c)10. Buildings, treatment, storage, or disposal operations or other structures such as recreation areas, runoff control systems, access and internal roads, storm, sanitary, and process sewerage systems, loading and unloading areas, fire control facilities.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)11. Barriers for drainage or flood control.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)12. Location of operational units within the facility where hazardous waste is or will be treated stored, including equipment cleanup areas.	3-17 and Appendix P Sheet 3 of 18			
(1)(d) Maps and Plans. The narrative in par. (a) shall be supplemented by the following maps or plans:	Appendix P			
(1)(d)1. USGS Quadrangle map. This shall be 7 ½ minute, topographic map if available. The radius of the coverage shall be sufficient to show sources of waste for a minimum of 3 miles. If impractical to show the site or facility locations relative to the source of waste, a separate location map displaying this information shall be provided.	Not Applicable			Because Badger has a national market this item was omitted from this submittal. A list of typical clientele can be found in Section 3, 3.1.4
(1)(d)2. Plat map. This shall indicate property boundaries and zoning within ½ mile of the proposed facility and anticipated traffic routes within 2 miles of the site or facility.	3-17 and Appendix P Sheet 5 of 18			
(1)(d)3. Existing site conditions map. The extent of coverage shall be the entire site and the area within	3-17 and			

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1/2 mile of the site boundaries. The minimum scale shall be one inch = 200 feet. Map details shall include the proposed site boundary, property lines, easements and rights-of-way, buildings, foundations, roads, utilities and other structures; topography, for the site only unless the map is needed to define drainage patterns around facility; wooded areas; location of soil borings and test pits; features of historical and archeological significance; and other physical site features as appropriate.	<i>Appendix P Sheet 3 of 18</i>			
(1)(d)4. Proposed facility plan. This plan shall include proposed site or facility access roads and traffic patterns, buildings, scales, utility lines, drainage diversion, screening, means of access control, final topography, areas to be cleared of vegetation, and other design features. The extent of coverage and scale shall be the same as that for the existing site conditions map.	<i>3-17 and Appendix P Sheet 2 of 18</i>			
(1)(e) If the presence of hazardous constituents has been detected in the groundwater at the point of standards application at the time of feasibility and plan of operation report submittal, the owner or operator shall submit sufficient information, supporting data and analyses to establish a compliance monitoring program which meets the requirements of ss. NR 635.05 to 635.15. Except as provided in s. NR 635.13(9), the owner or operator shall also submit an engineering feasibility plan for a corrective action program necessary to meet the requirements of s. NR 635.15, unless the owner or operator obtains written authorization in advance from the department to submit a proposed license schedule for submittal of the plan. To demonstrate compliance with s. NR 635.13, the owner or operator shall submit the following items:	<i>Not Applicable</i>			
(1)(e)1. A description of the wastes previously handled at the facility;	<i>Not Applicable</i>			
(1)(e)2. A characterization of the contaminated groundwater, including concentrations of hazardous constituents;	<i>Not Applicable</i>			
(1)(e) 3. A list of hazardous constituents for which compliance monitoring shall be undertaken in accordance with ss. NR 635.09 to 635.11;	<i>Not Applicable</i>			
(1)(e)4. Proposed concentration limits for each hazardous constituent, based on the criteria set forth in s. NR 635.09, including a justification for establishing any alternate concentration limits;	<i>Not Applicable</i>			
(1)(e)5. Detailed plans and an engineering report describing the proposed groundwater monitoring system in accordance with the requirements of ch. NR 635; and	<i>Not Applicable</i>			
(1)(e) 6. A description of proposed sampling, analysis and statistical comparison procedure to be utilized in evaluating groundwater monitoring data.	<i>Not Applicable</i>			
(1) (f) Design constraints. Recommendations on design constraints for development of the site considering all available data shall be made and reasons given for the recommendations. This shall include a discussion of the potential for the site to meet locational requirements in s. NR 630.18, and make conclusions and recommendations on site development. For expansion of existing facilities, the report shall include sufficient information to assess the effectiveness of the	<i>3-17</i>			

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existing facility design and operation in protecting air, surface water and groundwater quality.				
(1)(g) Engineering plans. Engineering plans, which shall consist of the following:	<i>3-18 and Appendix P &amp; Q</i>			
(1)(g) 1. A title sheet indicating the project title, who prepared the plans, the person for whom the plans were prepared, a table of contents and a location map showing the location of the site and if applicable the area to be served.	<i>3-17 and Appendix P, 8 1/2 x 11 index page</i>			
(1)(g) 2. A final site topography plan sheet indicating the appearance of the site at closing including the details necessary to prepare the site for long-term care.	<i>3-16 and Appendix P Sheet 2 of 18</i>			
(1)(h) Plan sheets. When applicable, the following information shall be presented on the plan sheets:	<i>3-17 and Appendix P</i>			
(1)(h)1. A survey grid with base lines and monuments to be used for field control.	<i>3-17 and Appendix P Sheet 3 of 18</i>			
(1)(h) 2. All drainage patterns and surface water drainage control structures both within the actual facility and at the site perimeter. Structures may include all piping, berms, sedimentation basins, pumps, culverts, inlets and methods of erosion control.	<i>3-17 and Appendix P Sheet 1 of 18</i>			
(1)(h)3. Ground surface contours at the time represented by the drawing. Spot elevations shall be indicated for key features.	<i>3-17 and Appendix P Sheet 1 &amp; 3 of 18</i>			
(1)(h)4. Access roads and traffic flow patterns to and within the facility.	<i>3-8 and Appendix P Sheet 2 of 18</i>			
(1)(h) 5. All temporary and permanent fencing.	<i>3-17 and Appendix P Sheet 2 of 18</i>			
(1)(h) 6. The methods of screening such as berms, vegetation or special fencing.	<i>3-17 and Appendix P Sheet 2 of 18</i>			
(1)(h) 7. Groundwater monitoring devices and detection systems.	<i>Not Applicable</i>			
(1)(h) 8. Support buildings, scales, utilities, gates and signs.	<i>3-17 and Appendix P Sheet</i>			

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(1)(h) 9. Special waste handling areas.	3-17 and Appendix P Sheet 2 of 18			
(1)(h) 10. Construction notes and references to details.	Appendix H and Appendix P			
(1)(h) 11. Other appropriate site features.	3-17 and Appendix P			
(2) STORAGE FACILITIES. In addition to the requirements of sub. (1), the feasibility and plan of operation report for hazardous waste container storage facilities shall include the following:	Section 4			
(2)(a) A description of the secondary containment system to demonstrate compliance with s. NR 640.13, including:	4-1			
The containment requirements in s. NR 640.13 are:  (1) Each storage area for containers shall have a containment system designed and constructed to have a continuous base which is free of cracks and gaps and is impervious to the material to be stored, and will contain any hazardous waste discharges, leaks or spills and precipitation until the collected material is detected and can be removed.	4-1			
The base of the storage areas shall be sloped or the containment system shall be otherwise designed and operated to drain and remove liquids resulting from hazardous waste discharges leaks, spills and any precipitation, unless the containers are elevated or otherwise protected from contact with accumulated liquids.	4-1			
The storage area shall have a discharge confinement structure with a minimum capacity equal to the contents of the largest container, or 10% of the total amount of stored waste, which ever is greater. If the storage area is not enclosed, the discharge confinement structure shall also provide sufficient freeboard to allow for containment of precipitation resulting from a 24-hour, 25-year storm.	4-1			
Surface water run-on to the containment system shall be prevented.	4-1			
Spilled, leaked, or discharged waste and accumulated precipitation shall be removed from a sump or the collection area in an expedient manner and quickly enough to prevent an overflow of the confinement system.				
(2) Management of hazardous waste in containers shall be conducted in such a manner that no discharge of hazardous waste occurs.	4-1			

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(3) If the department determines that there is potential for of hazardous waste or hazardous waste constituents to the environment, under s. NR 600.07, an owner or operator of a hazardous waste container facility may be required to comply with all or part of the requirements of chs. NR 600 to 685, including the groundwater and leachate monitoring and corrective action requirements of NR 635.	4-1			
(4) All hazardous waste managed in a container shall be managed in accordance with the requirements of chs. NR 631 (air emission standards for process vents), 632 (air emission standards for process leaks), and 633 air emission standards for tanks, surface impoundments and containers).	4-3			
(2)(a) 1. Basic design parameters, dimensions and materials of construction.	4-1			
(2)(a)2. How the design promotes drainage or how containers are kept from contact with standing liquids in the secondary containment system.	4-1			
(2)(a)3. Capacity of the secondary containment system relative to the number and volume of containers.	4-1			
(2)(a) 4. Provisions for preventing or managing run-on.	4-1			
(2)(a)5. How accumulated liquids can be analyzed and removed to prevent overflow.	4-1			
(2)(b) A description of how s. NR 630.17 (2) ( <i>handling of ignitable, reactive and incompatible waste to prevent types of incidents</i> ) shall be complied with to meet the requirements of ss. NR 640.10 and 640.15(2) ( <i>compatibility of waste with containers, and special requirements for incompatible wastes</i> ).	4-1			
The compatibility of waste with containers standard in s. NR 640.10, requires hazardous waste containers to be lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be stored so that the ability of the containers to contain the waste is not impaired.	4-1			
The specific requirements for incompatible waste in s. NR 640.15(2) requires hazardous waste not to be placed:	4-1			
(a) In an unwashed container that previously held an incompatible waste or material	4-1			
(b) In a container that holds incompatible waste or material, unless s. NR 630.17(2) is complied with.	4-2			
(2)(c) Sketches, drawings or data demonstrating compliance with the buffer zone requirements of s. NR 640.14 and 640.15(1).	4-1			
The special requirements for ignitable or reactive waste in s. NR 640.14, are that containers holding ignitable or reactive waste shall be located at least 50 feet from the facility's property line.	4-1			

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The special requirement for incompatible waste of s. NR 640.15(1), is that containers holding hazardous waste which is incompatible with any waste or other materials stored nearby in other containers, waste piles, open tanks or surface impoundments shall be separated from other wastes or materials or protected from them by means of a dike, berm, wall or other device.	4-1		
(2)(d) An operations and maintenance manual consisting of the following information:	4-2 and Appendix K		
(2)(d)1. Identification of the project title; engineering consultant; site owner, licensee and operator; proposed licensed acreage; site life and design capacity; municipalities, industries and collection and transportation agencies served; waste types and quantities to be disposed; and any exemptions applied for.	4-2 and Appendix K		
(2)(d) 2. Specifications for site construction and operation shall be presented, including detailed instructions to the site operator and any contractors for all aspects of site construction and operation. References to specifications on the plan sheets shall be pointed out as well as additional instructions included, where appropriate. The specifications shall include, as applicable, the following information:	4-2 and Appendix K		
(2)(d)2.a. Initial site preparations including specifications for clearing and grubbing, other excavations, drainage control structures, access roads and entrance, screening, fencing and other special design features.	4-2 and Appendix Q		
(2)(d)2.b. A plan for initial site preparations including a discussion of the field measurements, photographs to be taken and sampling and testing procedures to be utilized to verify that the infield conditions encountered were the same as those contained in the feasibility and plan of operation report.	4-2 and Appendix H Section 9		
(2)(d)3. A description of daily operations including, as appropriate, a discussion of the timetable for development, waste types accepted or excluded, typical waste handling techniques, hours of operation, traffic routing, drainage and erosion control, windy, wet and cold weather operations, fire protection equipment, manpower, methods for handling of incompatible waste types, methods for vector control, daily clean-up, recordkeeping, parking for visitors and employees, monitoring, backup equipment with names and telephone numbers where equipment may be obtained and other special design features. This may be developed as a removable section to improve accessibility for the site operator.	4-2 and Appendix K		
(2)(e) A design report shall be submitted which shall include supplemental discussions and design calculations to facilitate department review and provide supplemental information on financial responsibility for closure and long-term care as required by ss. 289.41 and 289.53, Stats., including the following information:	4-2 and Appendix J		
(2)(e) 1. A discussion of the reasoning and logic behind the design of the major features of the site or facility as appropriate, such as traffic routing, base grade and relationships to subsurface	4-2 & Appendix		

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conditions, anticipated waste types and characteristics, phases of development, facility monitoring, and similar design features shall be provided.	<i>K &amp; Q</i>			
A list of conditions of site development as stated in the department determination of the feasibility and the measures taken to meet the conditions shall be included.	<i>4-2 and Appendix K and Appendix Q</i>			
A discussion of all calculations, estimate of site life and surface water run-off shall be included. The calculations shall be summarized with the detailed equations presented in the appendix to the feasibility and plan of operation report.	<i>4-2 and Appendix K and Appendix Q</i>			
(2)(e)2. A closure plan as required by ss. NR 640.16 and 685.05.	<i>4-2 and Appendix J</i>			
The closure requirements in s. NR 640.16 are:  The owner or operator of a hazardous waste container facility shall meet the requirements specified in chs. NR 680 and 685 and the following requirements:	<i>4-2 and Appendix J</i>			
(1) The owner or operator of a facility that stores or treats hazardous waste in containers shall, at completion of closure, remove all hazardous waste and hazardous waste residues from the containment system. Remaining liners, bases, soil and related equipment or structures containing or contaminated with hazardous waste or hazardous waste residues shall be decontaminated or removed. This includes but is not limited to ash and sludges from treatment process and equipment, discharge control equipment and discharge confinement structures. All wastes or material which is decontaminated or removed shall be managed as a hazardous waste in accordance with the requirements of chs. NR 600 to 685, unless NR 605.04(3) applies (the material is no longer a hazardous waste).	<i>4-2 and Appendix J</i>			
(2) Final disposal of a hazardous waste may not be permitted at a hazardous waste storage facility, unless the facility has a separate license for disposal.	<i>4-2 and Appendix J</i>			
(2)(e)3. A detailed analysis in accordance with s. NR 685.07 of the financial responsibility for closure from the time of site or facility closing to termination.	<i>4-2 and Appendix J</i>			
(2)(f) A contingency plan as specified in ss. NR 630.21 and 630.22(1) and (2).	<i>4-2 and Appendix I</i>			
(2)(g) An appendix shall be submitted which shall include any additional data not previously presented, calculations, material specifications, operating agreements and other appropriate information.	<i>Included</i>			
(2)(h) Information on air emission control equipment as required in s. NR 633.15. [NR 633.15 does not exist.]	<i>4-3</i>			

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(3) TREATMENT FACILITIES. In addition to the requirements of sub. (1), the feasibility and plan of operation report for hazardous waste treatment facilities shall address compliance with the following:	Not Applicable			
(3)(a) The supplemental narrative information required by sub. (1)(d) shall include the following:	Not Applicable			
(3)(a)1. Proposed process layout. The extent of coverage shall include the receiving, processing and loadout areas. The minimum scale shall be one inch = 200 feet. Plan details shall include conceptual design for receiving area configuration and traffic flow patterns, treatment area and equipment configuration, loadout area and equipment configuration, traffic flow patterns and other pertinent design features.	Not Applicable			
(3)(a)2. Cross-sections. At least one cross-section shall be drawn through the treatment area, each process line where applicable, indicating existing topography, the design of building foundations and other permanent design features. More cross-sections may be necessary depending on complexity of site or facility design.	Not Applicable			
(3)(b) Complete construction plans and specifications detailing the exact configurations, locations, elevations, dimensions and construction and installation procedures for all structures, equipment and site modifications associated with the treatment process. Where practical the minimum scale utilized shall be one inch = 20 feet for buildings, equipment and structures, and one inch = 100 feet for site plans. To facilitate review, the construction plans and specifications shall include separate engineering drawings for the following:	Not Applicable			
(3)(b)1. Existing site conditions. The extent of coverage and plan details shall be the same as required for an existing site conditions map in sub. (1)(d)3.	Not Applicable			
(3)(b)2. Construction conditions. A plot plan shall be submitted which indicates the appearance of the site during facility construction. The extent of coverage and scale shall be identified to those required for an existing site conditions map in sub. (1)(d)3. The plot plan shall show limits of construction areas to be cleared of vegetation and topsoil, demolition of existing structures, areas of borrow and fill, temporary or permanent drainage diversion, soil erosion protection measures, construction access roads, soil and stripped vegetation stockpiles or storage areas, equipment storage areas, and other details necessary to determine the impacts during facility construction.	Not Applicable			
(3)(b)3. Facility plan. A plot plan shall be submitted showing the facility at completion of construction. The extent of coverage and scale shall be the same as required for an existing site conditions map in sub. (1)(d)3. Plan details shall include those required for an existing site conditions map and any modifications thereto, plus means of limiting access such as fencing, gates or natural barriers; methods of screening the facility from the surrounding area; general layout of receiving, processing and loadout areas and equipment; traffic flow patterns; access roads; and	Not Applicable			

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location of discrete air contaminant discharges.					
(3)(c)	A design report shall be submitted with the construction plans and specifications providing a discussion of design features, logic and calculations. The report shall contain the following:	<i>Not Applicable</i>			
(3)(c)1.	Where applicable, show calculations for size and configuration of receiving area; size, configuration and capacity of process treatment equipment, methods of handling liquid wastes resulting from operations such as floor drains, sewers and water treatment facilities; residence time and process equipment; size and configuration of loadout and storage facilities for process outputs; sizing of surface water drainage control structures; traffic queuing and flow patterns; design life of facility equipment, buildings and appurtenances; timetable for construction; and methods of screening the facility from the surrounding area. The calculations shall be summarized with detailed equations presented in an appendix to the feasibility and plan of operation report.	<i>Not Applicable</i>			
(3)(c)2.	Explain how the materials used in construction of the treatment facility shall be compatible, under expected operating conditions, with the hazardous waste and any treatment chemicals or reagents used in the treatment process.	<i>Not Applicable</i>			
(3)(c) 3.	Contain waste analyses for chemical, physical or biological treatment processes. In addition to the waste analysis required by s. NR 630.12, whenever a hazardous waste which is substantially different from waste previously treated in a treatment process or equipment at the facility is to be treated in that process or equipment, or a substantially different process than any previously used at the facility is to be used to chemically treat hazardous waste, the owner or operator shall:	<i>Not Applicable</i>			
(3)(c)3.a.	Conduct waste analyses and trial treatment tests, such as bench scale or pilot plant scale tests; or	<i>Not Applicable</i>			
(3)(c)3.b.	Obtain written, documented information on similar treatment of similar waste under similar operating conditions to show that this proposed treatment will meet all applicable requirements of par. (c) 2. and s. NR 630.17(2).	<i>Not Applicable</i>			
(3)(c)4.	All uncovered reaction containers shall be sized to provide no less than 2 feet freeboard at any time to prevent splashing or spillage of hazardous waste during the treatment.	<i>Not Applicable</i>			
(3)(c)5.	A facility shall have the capacity to remove and store the emergency transfer of reactor contents, or shall have emergency storage capacity to be used in the event of an equipment breakdown or malfunction.	<i>Not Applicable</i>			
(3)(c)6.	Where hazardous waste is continuously fed into a treatment process or equipment, the process or equipment shall be equipped with an automatic waste feed cutoff or a by-pass system, which is activated when a malfunction in the treatment process occurs.	<i>Not Applicable</i>			
(3)(c)7.	All residuals or by-products from a treatment process shall either be analyzed to determine whether they are a hazardous waste as identified in ch. NR 605 or be assumed to be a hazardous	<i>Not Applicable</i>			

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waste.				
(3)(c)8. Unloading of hazardous waste shall take place only in approved, designated areas.	<i>Not Applicable</i>			
(3)(c)9. If for any reason the treatment facility is rendered inoperable or is not able to completely process the hazardous waste, an approved alternative method shall be used for hazardous waste treatment or disposal.	<i>Not Applicable</i>			
(3)(c)10. Chemical, physical or biological treatment of hazardous waste, shall comply with the general requirements for ignitable, reactive or incompatible wastes in s. NR 630.17 (2).	<i>Not Applicable</i>			
(3)(c)11. Incompatible wastes shall not be placed in the same process or equipment used for chemical, physical or biological treatment.	<i>Not Applicable</i>			
(3)(c)12. Ignitable or reactive waste shall not be placed in a process or equipment used to chemically, physically or biologically treat a hazardous waste unless:	<i>Not Applicable</i>			
(3)(c)12.a. The waste is treated, rendered or mixed before or immediately after placement in the process or equipment so that the resulting mixture or dissolution of material no longer meets the criteria of ignitable or reactive waste in s. NR 605.08(2) or (4) so that s. NR 630.17(2) is complied with, or;	<i>Not Applicable</i>			
(3)(c)12.b. The waste is treated in such a way that it is protected from any material or conditions which may cause the waste to ignite or react.	<i>Not Applicable</i>			
(3)(d) Operations and maintenance manual. A manual shall be prepared with separate sections specifying operating and maintenance procedures for the following:	<i>Not Applicable</i>			
(3)(d)1. Facility startup and process shakedown. This shall include a discussion of personnel training; quantities and characteristics of hazardous waste to be processed; process line startup procedures and equipment performance evaluations; fire, dust, and vapor control systems; performance evaluations; process raw materials on hand at startup; process outputs testing; and other appropriate startup procedures.	<i>Not Applicable</i>			
(3)(d)2. Normal operations. This shall include a discussion of operating personnel responsibilities; hours of operation; daily processing schedule; routine process monitoring including monitoring quantity and quality of hazardous waste input; process output testing; equipment maintenance schedules; methods of controlling explosions, fire, odors and windblown materials; special waste handling procedures; method of controlling access; daily cleanup procedures; facility bypass procedures during major breakdowns and alternative means of disposal; person responsible for operation; site or facility licensee and owner; recordkeeping; emergency procedures for handling of freezep during cold weather; methods to prevent hazardous waste from burning; and other pertinent information.	<i>Not Applicable</i>			

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(3)(d)3. Record retention. Records of operating conditions as specified in s. NR 630.31.	<i>Not Applicable</i>			
(3)(d)4. Closure plan. A closure plan as required by ss. NR 640.16 and 685.05.	<i>Not Applicable</i>			
(3)(d)5. Detailed analysis. A detailed analysis in accordance with s. NR 685.07 shall be made of the financial responsibility for closer from the time of site facility closing to termination.	<i>Not Applicable</i>			
<b>Inspections - NR 640.12</b> (Referenced from s. NR 680.06(3)(e))	<i>4-4</i>			
(1) The owner or operator of a container storage facility shall inspect at least weekly, all containers and areas where containers are stored or treatment occurs, looking for leaks and deterioration of containers and the containment system, caused by corrosion or other factors in accordance with s. NR 630.15 (general inspection requirements).	<i>4-4 and Appendix E</i>			
Records of these inspections shall be maintained in accordance with s. NR 630.31 (recordkeeping).	<i>4-4 and Appendix E</i>			

- For separate small storage requirements, you should look at s. NR 640.07.
- Chapter NR 640 code sections which are not directly included in the NR 640 checklist but could be included later and do list requirements for container storage facilities are: NR 640.08, aisle space requirements; NR 640.09, condition of containers; NR 640.11, management of containers; and NR 640.12, inspections.

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WISCONSIN DEPARTMENT OF NATURAL RESOURCES  
CHAPTER NR 645 HAZARDOUS WASTE TANK SYSTEM STANDARDS  
RELICENSING REVIEW CHECKLIST

Facility Name: **Badger Disposal of WI., Inc.**

Instructions: Reviewers may customize this form by creating additional cells with headings & requirement items applicable to a specific facility by using the table title bar.

TANK SYSTEM STANDARDS - CHAPTER NR 645	SUBMITTAL PAGE	*C	**A	COMMENTS
<b>EXEMPTIONS - S. NR 645.04</b>				
(1) - (7) Does the facility meet any exemption requirements outlined in this section?	<i>Not Applicable</i>			
<b>FEASIBILITY &amp; PLAN OF OPERATION REPORT - S. NR 645.</b> (Referenced from s. NR 680.06(4)(b))	<i>Section 3</i>			
(1) ALL FACILITIES. No person shall establish, construct or expand a hazardous waste storage or treatment facility without first obtaining written approval of a feasibility and plan of operation report from the department. The feasibility and plan of operation report shall be submitted in accordance with the requirements of ss. 289.23 and 289.30, Stats., and ss. NR 680.05(1), 680.06(3) and 680.10, and shall contain the applicable material required by this section. Additional report requirements for storage and treatment tanks are included in subs. (2) and (3). Feasibility and plan of operation report requirements for small storage tank facilities, that meet the criteria in s. NR 645.16(1), are specified in s. NR 645.16(3).	<i>3-1</i>			
The feasibility and plan of operation report shall also contain the following information:				
(1)(a) A narrative describing:	<i>3-1</i>			
(1)(a)1. Legal description of the site.	<i>3-1</i>			
(1)(a)2. Present ownership of the site.	<i>3-1</i>			
(1)(a)3. Proposed site size and boundaries and present land use of the site and the area within a ½ mile of the site. Particular note shall be made of parks, hospitals, nursing homes, and areas of archaeological and historical significance.	<i>3-2</i>			
(1)(a)4. Area served, including population and major industries.	<i>3-3</i>			
(1)(a)5. A complete material balance for the facility, specifying the amounts and characteristics of the hazardous waste to be received and the amounts and characteristics of products and wastes which will be generated by the facility.	<i>3-3</i>			
(1)(a)6. Types of vehicles and access routes used to transport hazardous waste into and out of the site or facility, and	<i>3-5</i>			
an analysis of estimated traffic flow patterns on access routes and within the site or facility, and	<i>3-5</i>			

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an analysis of increased quantities of traffic on access routes into and out of the site or facility.				
If roads are to be used, current or proposed access roads and weight restrictions shall be included.	3-5			
(1)(a)7. Estimated quantities and characteristics of waste resulting from facility operations and methods of treatment and disposal.	3-7			
(1)(a)8. Person responsible for plant construction and operation.	3-7			
(1)(a)9. Quality and quantity of air discharge expected from plant operation.	3-7			
(1)(a)10. Appurtenances and procedures for the storage of hazardous waste beyond the end of the processing day, for the control of dust, odors, fire, windblown materials and potential explosion and for handling of hazardous waste in the case of major treatment facility breakdown.	3-8			
(1)(a) 11. Names and locations of all hazardous and solid waste disposal sites and facilities at which hazardous and solid waste from the treatment plant will be disposed.	3-9			
(1)(a)12. Overall site and facility layout including conceptual building design, sizing of receiving area, methods of processing, and sizing of major process equipment and process areas.	3-10			
(1)(a)13. A timetable for site or facility construction, startup and operation.	3-11			
(1)(a)14. Operating schedule.	3-11			
(1)(a)15. Provisions of protection of groundwater and surface waters during site or facility construction and operation.	3-11			
(1)(a)16. Conceptual design of equipment indicating its capacity and dimensions.	3-12, Appendix P Sheet 10 of 18			
(1)(a)17. The potential for the site to meet the location requirements in s NR 630.18.	3-12 and 2-5			
(1)(b) Regional Information. A discussion of the regional site setting to provide a basis for comparison and interpretation to site specific information obtained through field investigations and for analyzing siting and environmental considerations. Discussions should be limited to information available from publications, although some field verification and updating may be desirable. Discussions shall be supplemented by maps and cross-sections.	3-12			
The following items shall also be discussed.				
(1)(b)1. Topography, including predominant topographical features.	3-12			
(1)(b)2. Hydrology, including surface water drainage patterns and significant hydrologic features such as	3-14			

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surface water, springs, drainage basins and divides and wetlands.				
(1)(b)3. Geology, including nature and distribution of bedrock and unconsolidated deposits.	3-13			
(1)(b)4. Hydrogeology, including depth to groundwater, groundwater flow direction, recharge and discharge areas, groundwater divides, aquifers and identification of the aquifers use by public and private wells beneath the facility property and within one half mile of the proposed site, unless a demonstration is made to the department's satisfaction including why the information is not needed.	3-14			
(1)(b)5. Ground and surface water quality as described in available regional literature.	3-15			
(1)(b)6. Climatology.	3-15 & Appendix P Figure 1			
(1)(b)7. Identification of adjacent landowners.	3-16			
(1)(b)8. Zoning.	3-16			
(1)(b)9. Present land use with a particular emphasis on known recreational, historic or archeological areas.	3-16			
(1)(c) An existing and proposed site condition topographic plan. This shall be a detailed topographic survey of the facility area and all area within a 1500 feet of the facility. The minimum scale of this plan shall be one inch = 200 feet with a maximum 2-foot contour interval. The contour interval shall be sufficient to clearly show the pattern of the surface water flow in the vicinity of and form each operating unit of the facility. All elevations shall be related to USGS data. More than one plan sheet shall be prepared to show the required information if one sheet will be too detailed to be clear.	3-17 and Appendix P Sheet 3 of 18			
The plan or plans shall clearly show:				
(1)(c)1. 100-year floodplain area.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)2. Surface waters, including wetlands and intermittent streams.	3-17 and Appendix P Sheet 7 of 18			
(1)(c)3. Homes, buildings, man-made features and utility lines.	3-17 and Appendix P Sheet 3 of 18			
(1)(c)4. Surrounding land uses, such as recreational, commercial, agricultural, recreational and wooded areas.	3-17 and Appendix P Sheet 6 of 18			

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(1)(c)5. Proposed site boundary.	3-17 and Appendix P Sheet 2 of 18				
(1)(c)6. Property boundaries, facility and waste management boundaries, including previous solid and hazardous waste disposal areas.	3-17 and Appendix P Sheet 3 of 18				
(1)(c)7. Access control, such as fences and gates.	3-17 and Appendix P Sheet 2 of 18				
(1)(c)8. Water supply wells and any other wells, such as irrigation wells.	3-17 and Appendix P Sheet 3 of 18				
(1)(c)9. Well boring locations and observation well locations.	N/A				
(1)(c)10. Location of soil borings and test pits.	N/A				
(1)(c)11. A wind rose, which shows prevailing wind speed and direction.	3-15 & Appendix P Figure 1				
(1)(c)12. Buildings, treatment, storage, or disposal operations or other structures such as recreation areas, runoff control systems, access and internal roads, storm, sanitary, and process sewerage systems, loading and unloading areas, fire control facilities, easements and right-of-ways.	Appendix P Sheet 3 of 18				
(1)(c)13. Barriers for drainage or flood control.	Appendix P Sheet 3 of 18				
(1)(c)14. Features of historical or archeological significance.	Appendix N				
(1)(c)15. Location of operational units within the facility where hazardous waste is or will be treated stored, including equipment cleanup areas.	Appendix P Sheet 3 of 18				
(1)(d) Maps and Plans. The narrative in par. (a) shall be supplemented by the following maps or plans:	Appendix P				
(1)(d)1. USGS Quadrangle map. This shall be 7 ½ minute, topographic map if available. The radius of the coverage shall be sufficient to show sources of waste for a minimum of 3 miles. If impractical to show the site or facility locations relative to the source of waste, a separate location map displaying this information shall be provided.	N/A				Because Badger has a national market, this item was omitted from this submittal. A list of typical clientele can be found in Section 3, 3.1.4
(1)(d)2. Plat map. This shall indicate property boundaries and zoning within ½ mile of the proposed facility and anticipated traffic routes within 2 miles of the site or facility.	Appendix P Sheet 5 of 18				

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(1)(d)3. Proposed facility plan. This plan shall include proposed site or facility access roads and traffic patterns, buildings, scales, utility lines, drainage diversion, screening, means of access control, final topography, areas to be cleared of vegetation, and other design features. The extent of coverage and scale shall be the same as that for the existing site conditions map.	<i>Appendix P Sheet 2 of 18</i>			
(1)(e) If the presence of hazardous constituents has been detected in the groundwater at the point of compliance at the time of feasibility and plan of operation report submittal, the owner or operator shall submit sufficient information, supporting data and analyses to establish a compliance monitoring program which meets the requirements of ss. NR 635.05 to 635.15. Except as provided in s. NR 635.13(9), the owner or operator shall also submit an engineering feasibility plan for a corrective action program necessary to meet the requirements of s. NR 635.15, unless the owner or operator obtains written authorization in advance from the department to submit a proposed license schedule for submittal of the plan. To demonstrate compliance with s. NR 635.13, the owner or operator shall submit the following items:	<i>N/A</i>			
(1)(e)1. A description of the wastes previously handled at the facility;	<i>N/A</i>			
(1)(e)2. A characterization of the contaminated groundwater, including concentrations of hazardous constituents;	<i>N/A</i>			
(1)(e) 3. A list of hazardous constituents for which compliance monitoring shall be undertaken in accordance with ss. NR 635.05 to 635.15;	<i>N/A</i>			
(1)(e)4. Proposed concentration limits for each hazardous constituent, based on the criteria set forth in s. NR 635.09, including a justification for establishing any alternate concentration limits;	<i>N/A</i>			
(1)(e)5. Detailed plans and an engineering report describing the proposed groundwater monitoring system in accordance with the requirements of ss. NR 635.05 to 635.15; and	<i>N/A</i>			
(1)(e) 6. A description of proposed sampling, analysis and statistical comparison procedure to be utilized in evaluating groundwater monitoring data.	<i>N/A</i>			
(1) (f) Design constraints. Recommendations on design constraints for development of the site considering all available data shall be made and reasons given for the recommendations. This shall include a discussion of the potential for the site to meet locational requirements in s. NR 630.18. For expansion of existing facilities, the report shall include sufficient information to assess the effectiveness of the existing facility design and operation in protecting air, surface water and groundwater quality.	<i>3-5, Appendix K</i>			
(1)(g) Engineering plans, which shall consist of the following:	<i>3-18 and Appendix Q</i>			
(1)(g) 1. A title sheet indicating the project title, who prepared the plans, the person for whom the plans were prepared, a table of contents and a location map showing the location of the site and if applicable the area to be served.	<i>Appendix P, 8 1/2 x 11 Index Page</i>			



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(1)(g) 2. A final site topography plan sheet indicating the appearance of the site at closing including the details necessary to prepare the site for long-term care.	Appendix p, Sheet 2 of 18			
(1)(h) When applicable, the following information shall be presented on the plan sheets:	Appendix P			
(1)(h)1. A survey grid with base lines and monuments to be used for field control.	Appendix P Sheet 3 of 18			
(1)(h) 2. All drainage patterns and surface water drainage control structures both within the actual facility and at the site perimeter. The structures may include all piping, berms, sedimentation basins, pumps, culverts, inlets and methods of erosion control.	Appendix P Sheet 1 of 18			
(1)(h)3. Ground surface contours at the time represented by the drawing. Spot elevations shall be indicated for key features.	Appendix P Sheets 1 & 3 of 18			
(1)(h)4. Access roads and traffic flow patterns to and within the facility.	Appendix P Sheet 2 of 18			
(1)(h) 5. All temporary and permanent fencing.	Appendix P Sheet 2 of 18			
(1)(h) 6. The methods of screening such as berms, vegetation or special fencing.	Appendix P Sheet 23 of 18			
(1)(h) 7. Groundwater monitoring devices and detection systems.	N/A			
(1)(h) 8. Support buildings, scales, utilities, gates and signs.	Appendix P Sheet 2 of 18			
(1)(h) 9. Special waste handling areas.	Appendix P Sheet 2 of 18			
(1)(h) 10. Construction notes and references to details.	Appendix H & P			
(1)(h)11. Other appropriate site features.	Appendix P & Q			
(1)(i) Except as otherwise provided in s. NR 645.02, owners and operators of tanks shall provide the following information:	Section 5			
(1)(i)1. A written assessment that is reviewed and certified by an independent, qualified, registered professional engineer as to the structural integrity and suitability for handling hazardous waste of each tank system as required by ss. NR 645.07 and 645.08; ((Checklist for s. NR 645.07 and 645.08 are located in Numerical order in the 645 Checklist.)	5-1 and Appendix K			

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Ch. NR 645 Hazardous Waste Tank Standard

Checklist, Page 7

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(1)(i)2. Dimensions and capacity of each tank;	5-1 and Appendix K			
(1)(i) 3. Description of feed systems, safety cutoff, bypass systems and pressure controls, such as vents;	5-1 and Appendix K			
(1)(i)4. A diagram of piping, instrumentation and process flow for each tank system;	5-1 and Appendix K Sheets 14 & 15 of 18			
(1)(i)5. A description of materials and equipment used to provide external corrosion protection as required under s. NR 645.08(1)(c)2.;	5-1 and Appendix K			
The requirements of s. NR 645.08(1)(c)2., concerns the type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or tank system component, or one or more of the following:	5-1 and Appendix K			
a. Corrosion resistant materials of construction such as special alloys, fiberglass, reinforced plastics, etc.;	5-1 and Appendix K			
b. Corrosion resistant coating such as epoxy or fiberglass, with cathodic protection, such as impressed current or sacrificial anodes; and	5-1 and Appendix K			
c. Electrical isolation devices, such as insulating joints or flanges.	5-1 and Appendix K			
(1)(i) 6. For new tank systems, a detailed description of how the tank system shall be installed in compliance with s. NR 645.08(2) to (5). (Checklist for s. NR 645.08(2) through (5) is located in numerical order in the 645 Checklist.)	5-1 and Appendix K			
(1)(i) 7. Detailed plans and description of how the secondary containment system for each tank system is designed and constructed to meet the requirements of s. NR 645.09(3) to (8). (Checklist for s. NR 645.09(3) through (8) is located in numerical order in the 645 Checklist.)	5-1			
(1)(i) 8. For tank systems for which a variance from the requirements of s. NR 645.09 is sought as provided by s. NR 645.09(9):	Not Applicable			
(1)(i)8.a. Detailed plans, engineering and hydrogeologic reports, as appropriate, describing alternate design and operating practices that shall, in conjunction with location aspects, prevent the migration of any hazardous waste or hazardous constituents into the groundwater or surface water during the life of the facility, or	Not Applicable			
(1)(i)8.b. A detailed assessment of the substantial present or potential hazards posed to human health or the environment should a release enter the environment.	Not Applicable			
(1)(i)9. Description of controls and practices to prevent spills and overflows as required under s. NR 645.10 (2). (Checklist for s. NR 645.10(2) is located in numerical order in the 645 Checklist.)	5-1 and Appendix K			

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(1)(i)10. Detailed plans and description of how the secondary containment system for each tank system is or shall be operated to meet the requirements of s. NR 645.09 (3) to (8); and	5-1 and Appendix K			
(1)(i)11. For tank systems in which ignitable, reactive or incompatible wastes are to be stored or treated, a description of how the operating procedures and the tank system and facility design shall achieve compliance with the requirements of ss. NR 645.13 and 645.14(2). ( <i>Checklist for s. NR 645.13 and 14(2) are located in numerical order in the 645 Checklist.</i> )	5-1 and Appendix K			
(1)(i)12. Information on air emission control equipment as required by s. NR 635.15. <del>NR 633.15 does not exist.</del>				
(2) STORAGE FACILITIES. In addition to the requirements of sub. (1), the feasibility and plan of operation report for hazardous waste tank system storage facilities shall include the following:	Section 5			
(2)(a) A description of the secondary containment system to demonstrate compliance with s. NR 645.09, including:	5-1 and Appendix K			
(2)(a) 1. Basic design parameters, dimensions and materials of construction.	5-1 and Appendix K			
(2)(a)2. How the design promotes drainage or how tanks are kept from contact with standing liquids in the secondary containment system.	5-1 and Appendix K			
(2)(a)3. Capacity of the secondary containment system relative to the number and volume of tanks.	5-2 and Appendix K			
(2)(a) 4. Provisions for preventing or managing run-on.	5-2 and Appendix K			
(2)(a)5. How accumulated liquids can be analyzed and removed to prevent overflow.	5-2 and Appendix K			
(2)(b) A description of how s. NR 630.17 (2) ( <i>handling of ignitable, reactive and incompatible waste to prevent types of incidents</i> ) shall be complied with to meet the requirements of ss. NR 645.13 and 645.14 ( <i>special requirements for ignitable, reactive and incompatible wastes</i> ).	5-3			
The special requirement of s. NR 645.14(1), for incompatible waste is: (1) Hazardous waste may not be placed in a tank system that has not been decontaminated and that previously held an incompatible material unless s. NR 630.17(2), is complied with.	5-3			
(2)(c) Sketches, drawings or data demonstrating compliance with the buffer zone requirements of s. NR 645.13 (2) ( <i>ILHR 10</i> ).	5-3 and Appendix P Sheet 2 of 18			
(2)(d) An operations and maintenance manual consisting of the following information:	5-3 and Appendix K			
(2)(d)1. Identification of the project title; engineering consultant; site owner, licensee and operator; proposed licensed acreage; site life and design capacity; municipalities, industries and collection and transportation agencies served; waste types and quantities to be treated or stored; and any exemptions	5-3 and Appendix K			

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applied for.				
(2)(d) 2. Specifications for site construction and operation shall be presented, including detailed instructions to the site operator and any contractors for all aspects of site construction and operation. References to specifications on the plan sheets shall be pointed out as well as additional instructions included, where appropriate. The specifications shall include, as applicable, the following information:	5-4 and Appendix K			
(2)(d)2.a. Initial site preparations including specifications for clearing and grubbing, other excavations, drainage control structures, access roads and entrance, screening, fencing and other special design features.	5-3 and Appendix K and Q			
(2)(d)2.b. A plan for initial site preparations including a discussion of the field measurements, photographs to be taken and sampling and testing procedures to be utilized to verify that the infield conditions encountered were the same as those specified in the feasibility and plan of operation report.	5-3 and Appendix K and Q			
(2)(d)3. A description of daily operations including, as appropriate, a discussion of the timetable for development, waste types accepted or excluded, typical waste handling techniques, hours of operation, traffic routing, drainage and erosion control, windy, wet and cold weather operations, fire protection equipment, manpower, methods for handling of incompatible waste types, methods for vector control, daily clean-up, recordkeeping, parking for visitors and employees, monitoring, backup equipment with names and telephone numbers where equipment may be obtained and other special design features. This may be developed as a removable section to improve accessibility for the site operator.	5-3 and Appendix H and K			
(2)(e) A design report shall be submitted which shall include supplemental discussions and design calculations to facilitate department review and provide supplemental information on financial responsibility for closure and long-term care as required by ss. 289.41 and 289.53, Stats., including the following information:	5-3 and Appendix J			
(2)(e) 1. A discussion of the reasoning and logic behind the design of the major features of the site or facility as appropriate, such as traffic routing, base grade and relationships to subsurface conditions, anticipated waste types and characteristics, phases of development, facility monitoring, and similar design features shall be provided.	5-3 and Appendix K			
A discussion of all calculations, estimate of site life and surface water run-off shall be included. The calculations shall be summarized with the detailed equations presented in the appendix to the feasibility and plan of operation report.	Not Applicable			
(2)(e)2. A closure plan as required by ss. NR 645.17 and 685.05.	5-3 and Appendix J			
The requirements of s. NR 645.17, for a closure plan are:				
(1) Unless specifically exempted, the owner or operator of a facility that treats or stores hazardous waste shall meet the requirements specified in s. NR 685.05, and the following requirements for each tank system:	5-3 and Appendix J			

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(a) The owner or operator that stores or treats hazardous waste in tank systems shall:

1. At closure, remove or decontaminate all waste residues, contaminated secondary containment system components, such as liners, etc., contaminated soils, structures and equipment that are contaminated with hazardous waste, and manage them as hazardous waste, unless s. NR 605.04(3), applies. The closure plan, closure activities cost estimates for closure and financial responsibility for tank systems shall meet all of the requirements of ss. NR 600.03, 685.02, 685.05, 685.06, 685.07 and 685.08.
2. If the owner or operator demonstrates that not all contaminated soils can be practicably removed or decontaminated as required in subd. 1., then the owner or operator shall close the tank system and perform long-term care in accordance with the closure and long-term-care requirements that apply to landfills in ss. NR 660.18(23), 660.21 and 660.22. In addition, for the purpose of closure, long-term care and financial responsibility, the tank system shall meet all of the requirements for landfills specified in ss. NR 600.03, 685.02, 685.05, 685.06, 685.07 and 685.08.
3. If the owner or operator has a tank system that does not have secondary containment that meets the requirements of s. NR 645.09(4) to (8), and has not been granted a variance from the secondary containment requirements in accordance with s. NR 645.
  - a. The closure plan for the tank system shall include both a plan for complying with subd. 1. And a contingent plan for complying with subd. 2.
  - b. A contingent long-term care plan for complying with subd. 2. Shall be prepared and submitted as part of the feasibility and plan of operation report.
  - c. The cost estimates calculated for closure and long-term care shall reflect the costs of complying with the contingent closer plan and contingent long-term care plan, if those costs are greater than the costs of complying with the closure plan prepared for the expected closure under subd. 1.
  - d. Financial assurances shall be based upon the cost estimates in subd. 3.c.
  - e. For purposes of the contingent closure and long-term care plans, the tank system is considered to be a landfill, and the financial responsibility requirements for landfills under, ch. NR 660 and ss. NR 600.03, 685.05, 685.06, 685.07 and 685.08.

(b) The owner or operator of a facility that treats hazardous waste in tank systems shall, at completion of the closure, remove all hazardous waste and hazardous waste residues, including, but not limited to, ash and sludges, from the treatment process and equipment, discharge control equipment and discharge confinement structures. The department may require monitoring of groundwater or surface waters, if the operation or design of the facility in relation to the hazard of wastes handled at the facility warrants monitoring.

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<p>(2) Final disposal of hazardous waste may not be permitted at a hazardous waste storage or treatment facility, unless the facility has a separate license for disposal.</p> <p>(3) Prior to removal of underground tank systems, the owner or operator shall comply with the requirements of subd. (1) and undertake the following successive steps:</p> <p>(a) Disconnect and remove insofar as possible the inlet, outlet, gauge and vent lines;</p> <p>(b) Cap or plug open ends of remaining lines; and</p> <p>(c) Close all openings in the tank except for a 1/8 inch hole for venting, with pipe plugs before the tank is removed from the ground.</p>				
(2)(d)3. A detailed analysis in accordance with s. NR 685.07 of the financial responsibility for closure from the time of site or facility closing to termination.	5-4 and Appendix J			
(2)(f) A contingency plan as specified in ss. NR 630.21 and 630.22(1) and (2).	5-4 and Appendix I			
(2)(g) An appendix shall be submitted which shall include any additional data not previously presented, calculations, material specifications, operating agreements and other appropriate information.	Included			
(3) TREATMENT FACILITIES. In addition to the requirements of sub. (1), the feasibility and plan of operation report for hazardous waste treatment tank facilities shall address compliance with the following:	Not Applicable			
(3)(a) The supplemental narrative information required by sub. (1)(d) shall include the following:	Not Applicable			
(3)(a)1. Proposed process layout. The extent of coverage shall include the receiving, processing and loadout areas. The minimum scale shall be one inch = 200 feet. Plan details shall include conceptual design for receiving area configuration and traffic flow patterns, treatment area and equipment configuration, loadout area and equipment configuration, traffic flow patterns and other pertinent design features.	Not Applicable			
(3)(a)2. Design report. A design report shall be submitted with the construction plans and specifications providing a discussion of design features, logic and calculations. Where applicable, show calculations for size and configuration of receiving area; size, configuration and capacity of process treatment equipment, methods of handling liquid wastes resulting from operations such as floor drains, sewers and water treatment facilities; residence time and process equipment; size and configuration of loadout and storage facilities for process outputs; sizing of surface water drainage control structures; traffic queuing and flow patterns; design life of facility equipment, buildings and appurtenances; timetable for construction; and methods of screening the facility from the surrounding area. The calculations shall be summarized with detailed equations presented in an appendix to the feasibility and plan of operation report.	Not Applicable			
(3)(b) 1. Construction materials. The materials used in construction of the treatment facility shall be	Not Applicable			

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compatible, under expected operating conditions, with the hazardous waste and any treatment chemicals or reagents used in the treatment process.				
(3)(b) 2. Waste analyses for chemical, physical or biological treatment processes. In addition to the waste analysis required by s. NR 630.12, whenever a hazardous waste which is substantially different from waste previously treated in a treatment process or equipment at the facility is to be treated in that process or equipment, or a substantially different process than any previously used at the facility is to be used to chemically treat hazardous waste, the owner or operator shall:	<i>Not Applicable</i>			
(3)(b)2.a. Conduct waste analyses and trial treatment tests, such as bench scale or pilot plant scale tests; or	<i>Not Applicable</i>			
(3)(b)2.b. Obtain written, documented information on similar treatment of similar waste under similar operating conditions to show that this proposed treatment will meet all applicable requirements of par. (c) 2. and s. NR 630.17(2).	<i>Not Applicable</i>			
(3)(b)3. Uncovered reaction vessels. All uncovered reaction vessels shall be sized to provide no less than 2 feet freeboard at any time to prevent splashing or spillage of hazardous waste during the treatment.	<i>Not Applicable</i>			
(3)(b)4. Emergency transfer of reactor contents. A facility shall have the capacity to remove and store the emergency transfer of reactor contents, or shall have emergency storage capacity to be used in the event of an equipment breakdown or malfunction.	<i>Not Applicable</i>			
(3)(b)5. Malfunction abatement. Where hazardous waste is continuously fed into a treatment process or equipment, the process or equipment shall be equipped with an automatic waste feed cutoff or a by-pass system, which is activated when a malfunction in the treatment process occurs.	<i>Not Applicable</i>			
(3)(b)6. Residuals or by-product analysis. All residuals or by-products from a treatment process shall either be analyzed to determine whether they are a hazardous waste as identified in ch. NR 605 or be assumed to be a hazardous waste.	<i>Not Applicable</i>			
(3)(b)7. Unloading of hazardous waste. Unloading of hazardous waste shall take place only in approved, designated areas.	<i>Not Applicable</i>			
(3)(b)8. Alternate methods for treatment or disposal. If for any reason the treatment facility is rendered inoperable or is not able to completely process the hazardous waste, an approved alternative method shall be used for hazardous waste treatment or disposal.	<i>Not Applicable</i>			
(3)(b)9. Compliance with general requirements. Chemical, physical or biological treatment of hazardous waste, shall comply with the general requirements for ignitable, reactive or incompatible wastes in s. NR 630.17 (2).	<i>Not Applicable</i>			
(3)(b)10. Incompatible wastes. Incompatible wastes shall not be placed in the same process or equipment used for chemical, physical or biological treatment.	<i>Not Applicable</i>			

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Facility Name: **Baeger Disposal of WI., Inc.**

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(3)(b)11. Ignitable or reactive wastes. Ignitable or reactive waste shall not be placed in a process or equipment used to chemically, physically or biologically treat a hazardous waste unless:	<i>Not Applicable</i>			
(3)(b)11.a. The waste is treated, rendered or mixed before or immediately after placement in the process or equipment so that the resulting mixture or dissolution of material no longer meets the criteria of ignitable or reactive waste in s. NR 605.08(2) or (4) so that s. NR 630.17(2) is complied with, or;	<i>Not Applicable</i>			
(3)(b)11.b. The waste is treated in such a way that it is protected from any material or conditions which may cause the waste to ignite or react.	<i>Not Applicable</i>			
(3)(b)12. Secondary containment system. Detailed plans and description of how the secondary containment system for each tank system is or shall be operated to meet the requirements of s. NR 645.09(3) to (8); and	<i>Not Applicable</i>			
(3)(b)13. Operating procedures. For tank systems in which ignitable, reactive or incompatible wastes are to be stored, a description of how the operating procedures and the tank system and facility design shall achieve compliance with the requirements of ss. NR 645.13 and 645.14(2).	<i>Not Applicable</i>			
(3)(c) A manual shall be prepared with separate sections specifying operating and maintenance procedures for the following:	<i>Not Applicable</i>			
(3)(c)1. Facility startup and process shakedown. This shall include a discussion of personnel training; quantities and characteristics of hazardous waste to be processed; process line startup procedures and equipment performance evaluations; fire, dust, and vapor control systems; performance evaluations; process raw materials on hand at startup; process outputs testing; and other appropriate startup procedures.	<i>Not Applicable</i>			
(3)(c) 2. Normal operations. This shall include a discussion of operating personnel responsibilities; hours of operation; daily processing schedule; routine process monitoring including monitoring quantity and quality of hazardous waste input; process output testing; equipment maintenance schedules; methods of controlling explosions, fire, odors and windblown materials; special waste handling procedures; method of controlling access; daily cleanup procedures; facility bypass procedures during major breakdowns and alternative means of disposal; person responsible for operation; site or facility licensee and owner; recordkeeping; emergency procedures for handling of freezeup during cold weather; methods to prevent hazardous waste from burning; and other pertinent information.	<i>Not Applicable</i>			
(3)(d) Records of operating conditions as specified in s. NR 630.31.	<i>Not Applicable</i>			
(3)(e) A closure plan as required by ss. NR 645.17 and 685.05.	<i>Not Applicable</i>			
(3)(f) The owner or operator of a facility that chemically, physically or biologically treats hazardous waste shall inspect, where present:	<i>Not Applicable</i>			

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(3)(f)1. Discharge control and safety equipment, such as waste feed cut-off systems, bypass systems, drainage systems and pressure relief systems, at least once each operating day, to ensure that it is in good working order;	<i>Not Applicable</i>			
(3)(f) 2. Data gathered from monitoring equipment, such as pressure and temperature gauges, at least once each operating day, to ensure that the treatment process or equipment is being operated according to its design;	<i>Not Applicable</i>			
(3)(f)3. The construction materials of the process equipment, at least weekly, to detect corrosion or leaking of fixtures or seams; and	<i>Not Applicable</i>			
(3)(f)4. The construction materials of discharge confinement structures, such as dikes and the area immediately surrounding, at least weekly, to detect erosion or obvious signs of leakage, such as wet spots or dead vegetation.	<i>Not Applicable</i>			
<b>Assessment of an existing tank system's integrity - NR 645.07.</b> (Referenced from S. NR 645.06(1)(i)1.)				
(1) For each existing tank system that does not have secondary containment meeting the requirements of s. NR 645.09, the owner or operator shall determine that the tank system is not leaking or unfit for use. The owner and operator shall obtain and keep on file at the facility a written assessment reviewed and certified by an independent, qualified, registered professional engineer in accordance with s. NR 680.05(2)(d), that attests to the tank systems integrity by September 1, 1992.	<i>Not Applicable</i>			
(2) The assessment shall determine that the tank system is adequately designed and has sufficient structural strength and compatibility with the wastes to be stored or treated to ensure that it will not collapse, rupture or fail. At a minimum, this assessment shall consider the following:	<i>Not Applicable</i>			
(2)(a) Design standards, if available, according to which the tank and ancillary equipment were constructed;	<i>Not Applicable</i>			
(2)(b) Hazardous characteristics of the waste or wastes that have been and will be handled;	<i>Not Applicable</i>			
(2)(c) Existing corrosion protection measures;	<i>Not Applicable</i>			
(2)(d) Documented age of tank system, if available, or an estimate of the age;	<i>Not Applicable</i>			
(2)(e) Results of a leak test, internal inspection or other tank system integrity examination such that:	<i>Not Applicable</i>			
(2)(e)1. For underground tanks that can not be entered, the assessment shall include a leak test that is capable of taking into account the effects of temperature variation, tank end deflection, vapor pockets and high water table effects, and	<i>Not Applicable</i>			
(2)(e)2. For tanks other than those underground tanks that cannot be entered and for ancillary equipment, this assessment shall include either a leak test, as described above, or other integrity examination, that is certified by an independent, qualified, registered professional engineer in accordance with s. NR	<i>Not Applicable</i>			

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680.05(2)(d), that addresses cracks, leaks, corrosion and erosion.					
(4)	If, as a result of an assessment conducted in accordance with sub. (1), a tank system is found to be leaking or unfit for use, the owner or operator shall comply with the requirements of s. NR 645.12, response to leaks or spills and disposition of leaking or unfit for use tank systems.	<i>Not Applicable</i>			
(5)	Tank systems which contain volatile waste shall be in compliance with all appropriate air management rules contained in chs. NR 400 to 499 regarding the control of organic compound emissions.	<i>Not Applicable</i>			
<b>Design and installation of new tank system or new tank system components - NR 645.08.</b> (Referenced from s. NR 645.06(1)(i)1.)					
(1)	Owners or operators of new tank systems or tank system components shall obtain and submit to the department, at the time of the submittal of the FPOR, a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with s. NR 680.05(2)(d), Attesting that the tank system has sufficient structural integrity and is acceptable for storing and treating of hazardous waste. The assessment shall show that the foundation, structural support, seams, connections and pressure controls, if applicable are adequately designed and that the tank system has sufficient structural strength, compatibility with the wastes to be stored and treated and corrosion protection to ensure that it will not collapse, rupture or fail. This assessment, which will be used by the department to review and approve or disapprove the acceptability of the tank system design, shall include at a minimum the following information:	<i>Not Applicable</i>			
(1)(a)	Design standards according to which either tanks, or the ancillary equipment, or both, are constructed;	<i>Not Applicable</i>			
(1)(b)	Hazardous characteristics of the wastes to be handled;	<i>Not Applicable</i>			
(1)(c)	For new tank systems or tank system components in which the external shell of a metal tank or any external metal tank system component will be in contact with the soil or with water, submit a determination by a corrosion expert of:	<i>Not Applicable</i>			
(1)(c)1.	Factors affecting the potential for corrosion, including but not limited to: a. Soil moisture content; b. Soil pH; c. Soil sulfides level; d. Soil resistivity; e. Structure to soil potential; f. Influence of nearby underground metal structures such as piping; g. Existence of stray electric current; h. Existing corrosion protection measures, such as coating or cathodic protection.	<i>Not Applicable</i>			

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(1)(c)2. The type and degree of external corrosion protection that are needed to ensure the integrity of the tank system during the use of the tank system or tank system component, consisting of one or more of the following:	<i>Not Applicable</i>			
(1)(c)2.a. Corrosion resistant materials of construction such as special alloys, fiberglass reinforced plastic, etc.;	<i>Not Applicable</i>			
(1)(c)2.b. Corrosion resistant coating, such as epoxy of fiberglass, with cathodic protection, such as impressed current or sacrificial anodes; and	<i>Not Applicable</i>			
(1)(c)2.c. Electrical isolation devices, such as insulating joints or flanges.	<i>Not Applicable</i>			
(1)(d) Design consideration shall ensure that:	<i>Not Applicable</i>			
(1)(d)1. Tank foundations will maintain the load of a full tank;	<i>Not Applicable</i>			
(1)(d)2. Tank systems will be anchored to prevent floatation or dislodgment where the tank system is placed in the saturated zone, or is located within a seismic fault zone subject to the standards of s. NR 630.18(5); and	<i>Not Applicable</i>			
(1)(d)3. Tank systems will withstand the effects of frost heave.	<i>Not Applicable</i>			
(1)(e) For underground tank system components that are likely to be adversely affected by vehicular traffic, a determination of design or operational measures that shall protect the tank system against potential damage.	<i>Not Applicable</i>			
(2) The owner or operator of a new tank system shall ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing or placing a new tank system or tank system component in use, an independent qualified installation inspector or an independent, qualified, registered professional engineer, in accordance with s. NR 680.05(2)(d), either of whom is trained and experienced in the proper installation of tank systems or tank system components, shall inspect the system for presence of any of the items in the following list. All discrepancies shall be remedied before the tank system is covered, enclosed or placed in use. The items to be inspected include:  (a) Weld breaks; (b) Punctures; (c) Scrapes of protective coatings; (d) Cracks; (e) Corrosion; (f) Other structural damage or inadequate construction or installation.	<i>Not Applicable</i>			
(3) New tank systems or tank system components and piping that are placed underground and that are	<i>Not Applicable</i>			

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	backfilled shall be provided with a backfill material that is a noncorrosive, porous and homogenous substance and that is installed so that the backfill is placed completely around the tank and compacted to ensure that the tank and piping are fully and uniformly supported.				
(4)	All new tanks and ancillary equipment shall be tested for leak tightness prior to being covered, enclosed or placed in use. If a tank system is found to not be tight, all repairs necessary to remedy any leak in the system shall be performed prior to the tank system being covered, enclosed or placed in use.	Not Applicable			
(5)	Ancillary equipment shall be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion or contraction.	Not Applicable			
(6)	The owner or operator shall provide the type and degree of corrosion protection recommended by an independent corrosion expert, based upon the information provided in under sub. (1)(c), or other corrosion protection if the department, in review of the proposed installation under sub. (1), believes other corrosion protection is necessary to ensure the integrity of the tank system during the use of the tank system. The installation of a corrosion protection system that is field fabricated shall be supervised by an independent corrosion expert to ensure proper installation.	Not Applicable			
(7)	The owner or operator shall obtain and keep on file at the facility, written statements by those persons who are required to certify the design of the tank system, and supervise the installation of the tank system in accordance with the requirements of subs. (2) through (6), that attest that the tank system was properly designed and installed, and repairs, pursuant to subs. (2) through (4), were performed. These written statements shall also include the certification statements as required in s. NR 680.05(2)(d).	Not Applicable			
	<b>Secondary containment and the detection of releases - 645.09(3)through (8) (Referenced from s. NR 645.06((1)(i)6.)</b>				
	(3) In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment that meets the requirements of this section shall be provided, except as provided in subs. (8) and (9).  (a) For all new tank systems and tank system components prior to their being placed into service;  (b) For all existing tank systems used to store EPA Hazardous Waste Numbers, F020, F021, F022, F023, F026 and F027, by September 1, 1993.  (c) For those existing tank systems of known and documented age, by September 1, 1993, or when the tank system has reached 15 years of age, whichever comes later.	5-1			

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- (d) For those existing tank systems for which the age cannot be documented, by September 1, 1999, but if the age of the facility is greater than 7 years, secondary containment shall be provided by the time the facility reaches 15 years of age, or by September 1, 1993, whichever is later; and
- (e) For tank systems that store materials that become hazardous waste subsequent to September 1, 1991, within the time intervals required in pars. (A) to (d), except that the date that a material becomes a hazardous waste shall be used in place of September 1, 1991.

## (4) Secondary containment systems shall be:

- (a) Designed, installed and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater or surface water at any time during the use of the tank system; and
- (b) Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

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## (5) To meet the requirements of sub. (4), secondary containment systems shall at a minimum:

- (a) Constructed of or lined with materials that are compatible with wastes that are to be placed in the tank system and shall have sufficient strength and thickness to prevent failure owing to the pressure gradients including static head and external hydrological forces, physical contact with the waste to which it is exposed, climatic conditions and the stress of daily operation, including stresses from nearby vehicular traffic.
- (b) Placed upon a foundation or base capable of providing support to the secondary containment system, resistance to pressure gradients above and below the system and capable of preventing failure due to settlement.
- (c) Provided with a leak detection system that is designed and operated to detect the failure of either the tank system or secondary containment structure or the presence of any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours or at the earliest practical time if the owner or operator can demonstrate to the department that existing detection technologies or site conditions will not allow detection of a release within 24 hours; and
- (d) Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills or precipitation. Spilled or leaked waste and accumulated precipitation shall be removed from the secondary containment system within 24 hours, or in as timely a manner as possible to prevent harm to human health and the environment, if the owner or operator can demonstrate to the department that removal of the released waste or accumulated

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precipitation cannot be accomplished within 24 hours.				
<p>(6) Secondary containment systems shall include one or more of the following devices</p> <p>(a) A liner, external to the tank;</p> <p>(a)A vault;</p> <p>(b)A double walled tank;</p> <p>(c)An equivalent device as approved by the department.</p>	5-1			
<p>(7) Secondary containment system shall satisfy the following requirements:</p> <p>(a) External liner systems shall be:</p> <ol style="list-style-type: none"> <li>1.Designed or operated to contain 100% of the capacity of the largest tank and its ancillary equipment within its boundary;</li> <li>2.Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the secondary containment system has sufficient excess capacity to contain run-on or infiltration. The additional capacity shall be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;</li> <li>3.Free of cracks or gaps: and</li> <li>4.Designed and installed to surround the tank completely and to cover all surrounding earth likely to come into contact with the waste if the waste is released from the tank or tanks.</li> </ol>	5-1			
<p>(b) Vault systems shall be:</p> <ol style="list-style-type: none"> <li>1. Designed or operated to contain 100% of the capacity of the largest tank and its ancillary equipment within its boundary;</li> <li>2. Designed or operated to prevent run-on or infiltration of precipitation into the secondary containment system unless the secondary containment system has sufficient excess capacity to contain run-on or infiltration. The additional capacity shall be sufficient to contain precipitation from a 25-year, 24-hour rainfall event;</li> <li>3. Constructed with chemical resistant water stops in place at all joints, if any;</li> <li>4. Provided with an impermeable interior coating or lining that is compatible with the stored or treated waste and that shall prevent migration of waste into the construction material of the vault;</li> <li>5. Provided with a means to protect against the formation and ignition of vapors within the</li> </ol>	Not Applicable			

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vault, if the waste being stored or treated: a. Meets the criteria of ignitable waste; or b. Meets the criteria for reactive waste, and may form an ignitable or explosive vapor.

6. Provided with an exterior moisture barrier or be otherwise designed or operated to prevent migration of moisture into the vault if the vault is subject to hydraulic pressure

(c) Double walled tanks shall be:

1. Designed as an integral structure so that any release from the inner tank is contained by the outer shell.
2. Protected, if constructed from metal, from both corrosion of the primary tank interior and of the external surface of the outer shell; and
3. Provided with a built-in continuous leak detection system capable of detecting a release within 24 hours, or at the earliest practicable time, if the owner or operator can demonstrate to the department, and the department concludes, that the existing detecting technology or site conditions would not allow detection of a release within 24 hours.

*Not Applicable*

- (8) Ancillary equipment shall be provided with secondary containment, such as a trench, jacketing or double walled piping, that meets the requirements of subs. ((4) and (5), except for
- (a) Above ground piping, exclusive of flanges, joints, valves and o the connections that are inspected visually for leaks on a daily basis;
  - (b) Welded flanges, welded joints, and welded connections, that are inspected visually for leaks on a daily basis;
  - (c) Sealless or magnetic coupling pumps and sealless valves, that are inspected visually on a daily basis for leaks; and
  - (d) Pressurized above ground piping systems with automatic shut-off devices that are inspected visually for leaks on a daily basis.

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*(Referenced from s. NR 645.06(1)(i)9.)*

The requirements for s. NR 645.10(2) are the owner or operator at a minimum shall use appropriate controls and practices to prevent spills and overflows from tank or secondary containment systems. These shall include, at a minimum:

- (a) Spill prevention controls including check valves or dry disconnect couplings;
- (b) Overfill prevention controls, including level sensing devices, high level alarms, automatic feed cutoff or bypass to another tank; and

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Maintenance of sufficient freeboard in uncovered tanks to prevent overtopping by a wave or wind action or by precipitation.

**Secondary containment and detection of releases - NR 645.09(11)** (Referenced from NR 680.06(3)(e))

All tank systems, until the time that secondary containment that meets the requirements of this section is provided, shall comply with the following: *(This would only apply to tanks that are grandfathered.)* ...

- (1) Tank systems that are used to store or treat hazardous waste which contains no free liquids and are situated inside a building with an impermeable floor that is designed and constructed to have a continuous base which is free of cracks or gaps and is impervious to the material to be stored or treated, are exempt from the requirements in this section. To demonstrate the absence of free liquids in the stored or treated waste the following tests shall be used: method 9095, paint filter liquids test as described in EPA Publication SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", as incorporated by reference in s. NR 600.10(2)(b)1. and (c).

*Not Applicable**Not Applicable*

**Inspections - NR 645.11** (Referenced from NR 680.06(3)(e))

- (1) The owner or operator shall develop and follow a schedule and procedure for inspecting overfill controls.
- (2) The owner or operator shall inspect at least once each operating day:
- (2)(a) Overfill and spill control equipment, including waste feed cutoff systems, bypass systems and drainage systems to ensure that they are in good working order;
- (2)(b) The above ground portions of the tank system, if any to detect corrosion or releases of waste;
- (2)(c) Data gathered from monitoring and leak detection equipment, including pressure or temperature gauges and monitoring wells to ensure that the tank system is being operated according to its design; and

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(2)(d)	The construction materials and the area immediately surrounding the externally accessible portion of the tank system, including the secondary containment system, to detect erosion or signs of releases of hazardous waste.	5-4			
(3)	The owner or operator shall inspect cathodic protection systems, if present, according to, at a minimum, the following schedule to ensure that they are functioning properly:	<i>Not Applicable</i>			
(3)(a)	The proper operation of the cathodic protection system shall be confirmed within 6 months after initial installation and annually thereafter; and	<i>Not Applicable</i>			
(3)(b)	All sources of impressed current shall be inspected or tested or both, as appropriate, at least bimonthly.	<i>Not Applicable</i>			
(4)	The owner or operator shall document in the operating record of the facility each inspection of those items in subs. (1) to (3).	5-4			
<p>(Referenced from s. NR 645.06(1)(i)11.) The special requirements of S. NR 645.13 for ignitable or reactive waste are:</p> <p>(1) Ignitable or reactive waste shall not be placed in tank systems unless:</p> <p>(a) The waste is treated, rendered or mixed before or immediately after placement in the tank system so that:</p> <ol style="list-style-type: none"> <li>1. The resulting waste, mixture or dissolved material no longer meets the criteria for ignitable or reactive waste, and</li> <li>2. The general requirements for ignitable, reactive or incompatible wastes in s. NR 630.17(2), are complied with; or</li> </ol> <p>(b) The waste is stored or treated in such a way that it is protected from any material or conditions that may cause the waste to ignite or react; or</p> <p>(c) The tank system is used solely for emergencies.</p> <p>(2) The owner or operator of a facility where ignitable or reactive waste is stored or treated in a tank system shall comply with the requirements for the maintenance of protective distances between the waste boundary and any public ways, streets, alleys or an adjoining property line that may be built upon as required in ch. ILHR 10.</p>		5-3			
<p>(Referenced from s. NR 645.06(1)(i)11.)</p> <p>The special requirements of s. NR 645.14(2) for incompatible wastes is</p> <p>(2) Incompatible wastes, or incompatible waste and materials, shall not be placed in the same tank</p>		5-3 and Appendix K			

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system unless s. NR 630.17(2), is complied with.					
<b>Closure and long term care (Final Disposal) - NR 645.17(2)</b> (Referenced from s. NR 645.06(2)(b))					
(2)	Final disposal of hazardous waste may not be permitted at a hazardous waste storage or treatment facility, unless the facility has a separate license for disposal.	Not Applicable			

- For separate small storage requirements, you should look at s. NR 645.16.
- Chapter NR 645 code sections which are not directly included in the NR 645 checklist but could be included later and do list requirements for tank facilities are: NR 645.10, general operating requirements; NR 645.11, inspections; NR 645.12, response to leaks or spills and disposition of leaking or unfit for use tanks; and NR 645.15, waste analysis and trial tests, inspections.

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**WISCONSIN DEPARTMENT      NATURAL RESOURCES**  
**CHAPTER NR 680 HAZARDOUS WASTE PLAN REVIEW & LICENSING STANDARDS**  
**RELICENSING REVIEW CHECKLIST**

Facility Name: **Badger Disposal of WI., Inc.**

Notice: This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

This checklist includes ss. of NR 680.05 and 680.06, which contain requirements for the applicant regarding the **Feasibility and Plan of Operation Report (FPOR)** submittal. Requirements for department actions or requirements outside of the FPOR for the applicant are not included here. Reviewers may customize this form by creating additional cells with headings & requirement items applicable to a specific facility by using the table title bar.

TREATMENT, STORAGE & DISPOSAL FACILITY STANDARDS - CHAPTER NR 680	SUBMITTAL PAGE	*C	**A	COMMENTS
<b>GENERAL REPORT AND PLAN SUBMITTAL REQUIREMENTS - NR 680.05</b> The FPOR shall contain the following:				
<b>NR 680.05(1)</b>  GENERAL REQUIREMENTS. The submittal for review and approval shall provide information to demonstrate that a facility meets the locational requirements of S. NR 680.06(3)(i)4.b., c., and d. The submittal shall include the following:	<i>6-3 and 2-5</i>			
(1)(a) Review fees. The review fees specified in s. NR 680.45 in check or money order payable to the department. <i>(Fee should be paid at the time of submittal and generally before review is started.)</i>	<i>Included with Plan</i>			
(1)(b) Cover letter. A letter detailing the desired department action or response. The letter shall list each participating municipality and specify whether a copy has been submitted to it pursuant to s. NR 680.06(2).	<i>Included with Plan</i>			
(1)(c) Number of copies. The code says 5 copies, 2 to the region and 3 to Madison. <i>(Evaluate the number of copies necessary on a per site basis. How many DNR &amp; EPA review staff and the number of required clean copies for public review at various locations. Communicate this number with the facility in advance of submittal. This same approach also applies to the number of copies of the call-in letter.)</i>	<i>2 to Region</i>			
(1)(c)1. Certification. All reports and plan sheets shall be under the seal of and certified by a registered professional engineer. Example language is provided in NR 680.05(1)(c)1.	<i>Appendix S</i>			
(1)(c)1. Reports where interpretation of geology or hydrogeology is necessary shall be signed by a hydrogeologist. Example language is provided in NR 680.05(1)(c)1.	<i>Appendix N</i>			
(1)(c)1. Modifications and subsequent submittals shall also meet this certification requirement.	<i>Appendix O</i>			

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Facility Name: er Disposal of WI., Inc.

Ch. NR 680 Hazardous Waste Plan Review &amp; Licensing Standar

ecklist, Page 2

## PLAN REVIEW &amp; LICENSING STANDARDS - CHAPTER NR 680

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NR 680.05(1)(c)2. Technical procedures. All technical procedures used to investigate a hazardous waste facility shall be the current standard procedures as specified by the ASTM or the USGS, standard methods for the examination of water or wastewater, or other equivalent or appropriate methods approved by the department. Test procedures used shall be specified. Any deviation from a standard method shall be explained in detail, with reasons provided.				
(1)(c)3. Required information. The required technical information as specified in chs. NR 600 to 680.				
(1)(c)4. Visuals. Maps, figures, photographs, and tables, where applicable, to clarify information or conclusions. The visuals shall be legible. All maps, plan sheets, drawings, isometrics, cross-sections and aerial photographs shall meet the following requirements:				
(1)(c)4.a. Be of appropriate scale to show all required details in sufficient clarity.				
(1)(c)4.b. Be numbered, referenced in the narrative, titled, have a legend of all symbols used, contain horizontal and vertical scales where applicable, and specify drafting or origination dates.				
(1)(c)4.c. Use uniform scales as much as practical.				
(1)(c)4.d. Contain a north arrow.				
(1)(c)4.e. Use USGS data as a basis for all elevations.				
(1)(c)4.f. Plan sheets showing site construction, operation or closure topography shall also show original topography.				
(1)(c)4.g. Plan sheets for hazardous waste facilities shall indicate a survey grid based on monuments established in the field specifically for that purpose.				
(1)(c)4.h. Plan sheets shall be no smaller than 24 inches x 36 inches. All other documents shall be no larger than 24 inches x 36 inches and no smaller than 8 1/2 inches x 11 inches.				
(1)(c)4.i. All cross-sections shall show survey grid locations and be referenced to major plan sheets.				
(1)(c)5. Table of contents. A table of contents listing all sections of the submittal.	<i>i-v</i>			
(1)(c)6. Appendix. An appendix listing names of all references, all necessary data, procedures and calculations.	<i>Appendix A-S</i>			
(2) SIGNATORIES TO REPORTS. All reports required by the department, except for manifests, shall be signed by a person described in this subsection or a duly authorized representative as designated in par. (d).				
(2)(a) For a corporation, by a responsible corporate officer. Definition in 608.05(2)(a)1 and 2.				
(2)(b) For a partnership or sole proprietorship, by a general partner or proprietor, respectively.				

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NR 680.05(2)(c) For a government or public agency, by either a principal executive officer or ranking elected official. Definition in 680.05(2)(c)1 and 2.				
(2)(d) A person is a duly authorized representative if:  1. The authorization is made in writing by the person designated under paragraphs (a) to (c);  2. The authorization specifies an individual or position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, superintendent or possession of equivalent responsibility; and  3. The written authorization is submitted to the department.				
(2)(e) If the authorization under par. (d) is no longer accurate, due to individual or position description change, a new authorization satisfying the requirements of par. (d) shall be submitted to the department prior to or together with any reports to be signed by the authorized representative.				
(2)(f) Any person signing a document under this subsection shall make a certification statement as written in NR 680.05(2)(f).				
<b>GENERAL FEASIBILITY REPORT, PLAN OF OPERATION, AND FEASIBILITY AND PLAN OF OPERATION REPORT REQUIREMENTS - S. NR 680.06</b>				
<b>NR 680.06(1) LOCAL APPROVALS.</b>  A NEW or EXPANDING (class 3 modification) facility must obtain local approvals as described in NR 680.06(1), hold the public meeting as in 680.06(1m) and submit reports to each participating municipality. See specific conditions that are given in NR 680.06. The FPOR shall contain documentation that this subsection has been complied with.	<i>Not Applicable</i>			
An applicant that is RE-LICENSING must show that previously obtained local approvals are still applicable and there were no clauses or special requirements in the original approval that would require the facility to seek new approvals at the time of relicensing or on some other regular basis. If there are no conditions in the original local approval, then the facility does not need new local approvals. The FPOR shall contain documentation that this subsection has been complied with.  <i>NOTE: The definition of "affected municipality" has changed since the first facility licenses were written in the mid to late 1980's. The old definition required notice to all municipalities within 1000 feet of the facility. The new one requires notice to all municipalities within 1500 feet. If you have a facility that would now have to notify and seek additional local approvals, seek their community cooperation and compliance. If they refuse, contact Pete Flaherty for a legal interpretation to the applicability of this new requirement.</i>	<i>6-1 and Appendix L</i>			
The FPOR shall contain documentation that this subsection has been complied with.	<i>6-1 and Appendix L</i>			



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<b>NR 680.06(1m) PRE-APPLICATION PUBLIC MEETING AND NOTICE.</b>  This section is only applicable to a NEW or EXPANDING (class 3 modification) facility. It does not apply to simple relicensing. If the review is for a NEW or EXPANDING facility, then all the requirements of this section must be met and submitted as specified in this section of the code. Reference the code in that situation.	<i>Not Applicable</i>			
<b>(2) SUBMISSION OF REPORTS.</b> An applicant shall submit a FPOR to the department in accordance with ss. 289.23 to 289.29, Stats.	<i>Not Applicable</i>			
At the same time the applicant shall submit a copy of the FPOR to each participating municipality under s. 289.33(6)(b), Stats.	<i>Not Applicable</i>			
The applicant shall notify the department of when and to whom the copies of the FPOR were submitted.	<i>Not Applicable</i>			
<b>(2m) NONCOMPLIANCE WITH PLANS OR ORDERS.</b> The FPOR shall contain the following:				
(2m)(a) Identification of all persons owning a 10% or greater legal or equitable interest in the applicant or in the assets of the applicant, including shareholders of a corporation which is an applicant and partners of a partnership which is an applicant.	3-1			
(2m)(b) Identification of all other Wisconsin solid or hazardous waste facilities for which the applicant or any person identified in par. (a), is named in, or subject to an order or plan approval issued by the department.	<i>Not Applicable</i>			
(2m)(c) Identification of all other Wisconsin solid or hazardous waste facilities which are owned by persons, including corporations and partnerships, in which the applicant or person identified in par. (a), owns or previously owned a 10% or greater legal or equitable interest or a 10% or greater interest in the assets.	<i>Not Applicable</i>			
(2m)(d) A statement indicating whether or not all plan approvals and orders relating to all facilities identified in pars. (b) and (c) are being complied with.	<i>Not Applicable</i>			
<b>NR 680.06(3) GENERAL CONTENTS OF FPOR.</b> The following information shall be included in the FPOR in addition to any facility specific requirements.				
(3)(a) A general description of the facility and a Part A application for the hazardous waste permit, completed with the most recent information, including all the required maps, drawings and photographs.	6-2 and Appendix A			
(3)(b) Chemical and physical analyses of the hazardous waste and hazardous debris to be handled at the facility. At a minimum, these analyses shall contain all the information, which must be known to store, treat and dispose of hazardous waste in accordance with chs. NR 600 to 685.	6-2 and Appendix D			
(3)(c) A copy of the waste analysis plan required under s. NR 630.13(1).	6-2 and Appendix D			
(3)(d) A description of the security procedures and equipment required by s. NR 630.14.	6-2 and 2-3			
(3)(e) A copy of the general inspection schedule required by s. 630.15(2). Include where applicable, as part of the inspection schedule, specific requirements in ss. NR 631.06(2); 632.06(1),(2) and (7); 633.11, 633.14; 640.12(1); 645.09(11); 645.11; 655.08; 660.18(13),(31)(a) and (32); and 670.09.	6-2 and App. E			



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NR 680.06(3)(f) A description of procedures, structures or equipment used at the facility to:				
(3)(f)1. Prevent hazards in unloading operations through the use of equipment such as ramps, special forklifts;	6-2 and Appendix I			
(3)(f)2. Prevent runoff from hazardous waste handling areas to other areas of the facility or environment, or to prevent flooding such as berms, dikes, trenches;	6-2 and Appendix I			
(3)(f)3. Prevent contamination of water supplies;	6-2 and Appendix I			
(3)(f)4. Mitigate effects of equipment failure and power outages; and	6-2 and Appendix I			
(3)(f)5. Prevent undue exposure of personnel to hazardous waste. <i>Ex.- describe PPE that is used on-site, facility wide. List areas that have specific protection requirements.</i>	6-2 and Appendix I			
(3)(g) A description of precautions to prevent accidental ignition or reaction of ignitable, reactive or incompatible wastes as required to demonstrate compliance with s. NR 630.17 including documentation demonstrating compliance with s. NR 630.17(3).	6-3 and 2-4			
(3)(h) A description of vicinity and site traffic patterns, estimated volume and controls. If applicable show turns across traffic lanes and stacking lanes, describe access roads and bearing capacity and traffic control signals.	6-3 and 3-5			
(3)(i) Facility location information:	6-3 and 2-5			
(3)(i)1. Owners and operators of facilities shall identify whether the facility is located within a 100-year floodplain.	6-3 and 2-6			
This identification shall indicate the source of the data for the determination and include a copy of the relevant federal insurance administration (FIA) flood map, if used, or the calculations and maps used where an FIA map is not available.	6-3 and 2-6			
(3)(i)1. Information shall be provided identifying the 100-year flood level and any other special flood factors, such as wave action, which shall be considered in designing, construction, operating or maintaining the facility to withstand washout from a 100-year flood.	6-3 and 2-3			
(3)(i)2. Owners and operators of facilities operating under an interim license, variance or waiver located in the 100-year floodplain shall prepare and provide the department the following information: (See code for specifics of a-c below if site is in floodplain and this is applicable.)	Not Applicable			
(3)(i)2.a. Engineering analysis.	Not Applicable			



Facility Name: **Bauger Disposal of WI., Inc.**

PLAN REVIEW & LICENSING STANDARDS - CHAPTER NR 680		SUBMITTAL PAGE	*C	**A	COMMENTS
(3)(i)2.b. Structural or other engineering studies.	<i>Not Applicable</i>				
(3)(i)2.c. If applicable, a detailed description to remove waste to safety before flooding.	<i>Not Applicable</i>				
NR 680.06(3)(i)3. Owners or operators of facilities operating under an interim license, variance or waiver and which are not in compliance with subd. 2 shall provide a plan and schedule demonstrating how the facility will come into compliance with the requirements of subd. 2.	<i>Not Applicable</i>				
(3)(i)4. Information to demonstrate that the facility meets the following locational requirements or, if appropriate, a request for an exemption from these requirements according to s. NR 680.04:	<i>6-3 and 2-5</i>				
(3)(i)4.a. Except as provide in this paragraph for facilities operating under an interim license, a hazardous waste facility may not be located in a floodplain.	<i>6-3 and 2-5</i>				
(3)(i)4.b. A hazardous waste facility may not be located in a wetland.	<i>6-3 and 2-6</i>				
(3)(i)4.c. A hazardous waste facility may not be located in a habitat determined by the department to be a critical to the continued existence of any endangered species listed in ch. NR 27.	<i>6-3 and 2-6</i>				
(3)(i)4.d. The department may require the active portions of the facility to be located up to 200 feet away from the property line of the facility.	<i>6-3 and 2-7</i>				
(3)(j) An outline of both the introductory and continuing training programs by owners or operators to prepare persons to operate or maintain the facility in a safe manner as required to demonstrate compliance with s. NR 630.16,	<i>6-3 and Appendix F</i>				
and a brief description of how training will be designed to meet actual job tasks in accordance with the requirements in s. NR 630.16(1)(b)	<i>6-3 and Appendix F</i>				
(3)(k) For facilities where hazardous waste was disposed of before the submittal of the FPOR, a copy of the survey plat and record of the type, location and quantity of those wastes, and documentation that this was submitted to the register of deeds as required by s. NR 685.05(10).	<i>Not Applicable</i>				
(3)(L) An existing site condition topographic plan sheet which meets the requirements of s. NR 660.09(2).	<i>Not Applicable</i>				
(3)(m) For hazardous debris, a description of the debris categories and contaminant categories to be treated, stored or disposed at the facility.	<i>Not Applicable</i>				
<b>NR 680.06(4) FACILITY SPECIFIC REQUIREMENTS.</b>					
The following requirements must be addressed in the FPOR as applicable to the facility under review.					
(4)(a) The FPOR requirements of ch. NR 640 for containers.	<i>Section 3</i>				
(Use the ch. NR 640 checklist for review and approval of specific container standards for the FPOR submittal if facility stores in containers.)					

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Facility Name: er Disposal of WL, Inc.

## PLAN REVIEW &amp; LICENSING STANDARDS - CHAPTER NR 680

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NR 680.06(4)(b) The FPOR requirements of ch. NR 645 for tank systems. (Use the ch. NR 645 checklist for review and approval of specific tank standards for the FPOR submittal if facility stores waste in tanks.)	Section 3			
(4)(c) The FPOR requirements of ch. NR 655 for waste piles. (Specific checklist for waste piles has not been developed. Reviewer must check NR 655 for these requirements if applicable for the facility under review. )	Not Applicable			
(4)(d) The FPOR requirements of ch. NR 665 for incinerators. (Specific checklist for incinerators has not been developed. Reviewer must check NR 665 for these requirements if applicable for the facility under review.)	Not Applicable			
(4)(e) The FPOR requirements of ch. NR 670 for miscellaneous units. (Specific checklist for miscellaneous units has not been developed. Reviewer must check NR 670 if applicable for the facility under review).	Not Applicable			
(5) LANDFILL AND SURFACE IMPOUNDMENT REQUIREMENTS. (Specific requirements checklist, has not been developed. See NR 680.06(5) and NR 660 if applicable for the facility under review.)	Not Applicable			
NR 680.06(6) ENVIRONMENTAL REVIEW. The FPOR shall include an environmental assessment section. The assessment shall address the following items:	6-3 and Appendix N			
(6)(a) <i>Project summary.</i> Include a brief summary of the project. Particular attention shall be given to the following:	6-3 and Appendix N			
(6)(a)1. The purpose and need for the proposed project including the history and background on the project.	6-3 and Appendix N			
(6)(a)2. A listing of the statutory authority and other relevant local, state, and federal permits or approvals required as well as a discussion of the need for exemptions, zoning changes and any other special permits.	6-3 and Appendix N			
(6)(a)3. The estimated cost and funding source for the project.	6-3 and Appendix N			
(6)(b) A brief description of the proposed physical changes including:	6-3 and Appendix N			
(6)(b)1. The discussion shall cover the changes in terrestrial resources including quantity of excavated material	6-4 & Append. N			

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and the lateral extent of soil removal, quantity and source for imported materials. Any significant terrestrial modifications that change grade such as construction of roads, change in water drainage features, etc.				
NR 680.06(6)(b)2. Changes in aquatic resources including the potential impacts to streams, wetlands, lakes, and flowages. This discussion shall include discharge rates and volumes for surface water control structures, and surface water runoff under existing conditions as well as that anticipated during active operation and following closure.	6-3 and Appendix N			
(6)(b)3. Buildings, treatment units, roads and other structures to be constructed in conjunction with this facility. The discussion shall include the size of the facilities and the number of miles of road to be constructed.	6-3 and Appendix N			
(6)(b)4. Emissions and discharges such as dust, diesel exhaust, odors, gases, surface water runoff and collected groundwater associated with facility preparation, construction, operation, closure and following closure of the facility.	6-3 and Appendix N			
(6)(a)5. Other changes anticipated with facility development.	Not Applicable			
(6)(a)6. Maps, plans and other descriptive material to clarify the discussion such as a county map showing the general area of the project, a USGS topographic map, a plat map, zoning map, county wetlands map, and a facility development plan.	Appendix P			
(6)(c) <i>Existing environment.</i> Include a brief description of the existing environment that may be affected by this development. At a minimum this shall contain:	6-3 and Appendix N			
(6)(c)1. A description of the physical environment including the regional and local topography, geology, surface water drainage features, hydrogeologic conditions, air, wetlands, and earth borrow sources as well as an evaluation of the groundwater quality data and overall performance of any existing solid and hazardous waste units.	6-3 and Appendix N			
(6)(c)2. The dominant aquatic and terrestrial plant and animal species and habitats found in the area including threatened or endangered species and amount, type and hydraulic value of wetlands.	6-3 and Appendix N			
(6)(c)3. Land use including dominant features and zoning in the area.	6-3 and Appendix N			
(6)(c)4. Social and economic conditions including any ethnic and cultural groups.	6-3 and Appendix N			
(6)(c)5. Other special resources such as archeological, historical, state natural areas and prime agricultural lands.	6-3 and Appendix N			
(6)(d) <i>Environmental consequences.</i> A brief discussion of the probable adverse and beneficial impacts including primary, indirect and secondary impacts shall include:	6-3 and Appendix N			



PLAN REVIEW & LICENSING STANDARDS - CHAPTER NR 680	SUBMITTAL PAGE	*C	**A	COMMENTS
(6)(d)1. The physical impacts which would be associated with facility design, construction and operation including visual impacts if applicable.	6-3 and Appendix N			
(6)(d)2. The biological impacts including destruction and creation of habitat, alteration of the physical environment and any impacts to endangered or threatened species.	6-3 and Appendix N			
(6)(d)3. Impacts on land use.	6-3 and Appendix N			
(6)(d)4. The social and economic impacts to local residents and cultural groups, and the communities and industries served by the facility.	6-3 and Appendix N			
(6)(d)5. Other special resources such as archeological, historical, state natural areas and prime agricultural lands.	6-3 and Appendix N			
(6)(d)6. Probable adverse impacts that can not be avoided including groundwater and surface water impacts, modifications of topography, any loss of agricultural and forest land, displacement of wildlife and adverse aesthetic impacts for people in and around the facility.	6-3 and Appendix N			
(6)(e) <i>Alternatives</i> . Identify, describe and discuss feasible alternatives including taking no action; enlargement, reduction, or modification of the project; other facilities, locations or methods to the proposed action and their impacts. Particular attention shall be given to alternatives which might avoid some or all adverse impacts, including proposed and existing hazardous waste treatment, storage or disposal, recycling and incineration facilities that may serve to handle the waste expected to be received at the proposed facility, taking into account the economics of waste collection, transportation and disposal.	6-3 and Appendix N			
(7) SMALL STORAGE FACILITIES. (see NR 680.06(7))	Not Applicable			
(8) NEEDS. The FPOR shall contain an evaluation to justify the need for the proposed facility in accordance with s. 289.28(1), Stats., unless the facility is exempt under s. 289.28(2), Stats.	6-3			

The rest of Chapter 680 is specific to requirements for various public notices and public participation, time frames for review, completeness, modifications, etc. Specific DNR procedural requirements and timelines are covered in the procedural guidance. Additional 680 sections are specific to construction and new facilities so the reviewer will need to check the rest of the chapter to see if there are additional applicable sections.







# **SPECTRUM ENGINEERING INCORPORATED**

262-783-7725  
FAX 262-783-7726

March 17, 2006

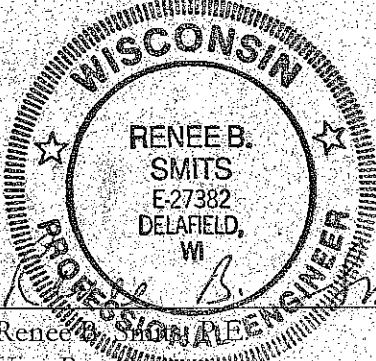
Mr. Henry J. Krier  
President  
Badger Disposal of WI, Inc.  
5611 W. Hemlock Street  
Milwaukee, WI 53223

**Subject: Review and Certification of Feasibility and Plan of Operation Report  
For Hazardous Waste Storage Facility  
Spectrum Engineering Project No. 05490**

Dear Mr. Krier:

I have reviewed the Feasibility and Plan of Operation Report for the Badger Disposal of Wisconsin Hazardous Waste Storage Facility located at 5611 West Hemlock Street in Milwaukee, Wisconsin, and I have determined that the report contains the elements required by Wisconsin Administrative Code Chapters NR 630, NR 640, and NR 680. This review is limited to data provided in the Feasibility and Plan of Operation Report dated March 17, 2006, and kept on file at Spectrum Engineering. This review in no way assumes responsibility for Plan implementation or design work performed by others.

I, Renee B. Smits, hereby certify that I am a registered professional engineer in the State of Wisconsin in accordance with Ch. A-E 4, Wisconsin Administrative Code and that this report has been prepared in accordance with the Rules of Professional Conduct in Ch. A-E 8, Wisconsin Administrative Code.

  
Renee B. Smits  
Vice President  
Spectrum Engineering Incorporated  
P.E. Certificate Number E-27382

3/17/2006  
Date



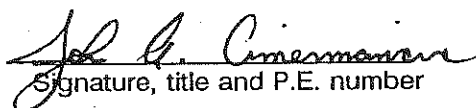


**ATTACHMENT 14: CERTIFICATIONS**

**P.E. Certification**

**Note:** Engineering certification may be demonstrated by using the following language:

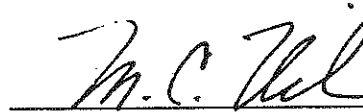
"I, JOHN A. CIMERMANCIC hereby certify that I am a registered Professional Engineer in the state of Wisconsin in accordance with ch. A-E 4, Wis. Adm. Code and that this report has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code."

  
Signature, title and P.E. number



**EOG Certification**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

  
Michael C. Villone, President  
EOG Disposal, Inc.



I, Gary J. Rollinger, hereby certify that I am a registered Professional Engineer in the State of Wisconsin in accordance with Ch. A-E 4, Wis. Adm. Code and that this report has been prepared in accordance with the Rules of Professional Conduct in Ch. A-E 8, Wis. Adm. Code.

Gary J. Rollinger  
Gary J. Rollinger  
Wisconsin Professional Engineer  
License Number E-16989



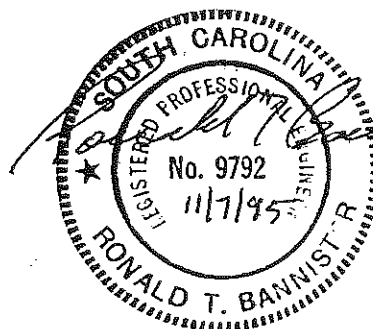


NOVEMBER 10, 1995

P.E. Certification

"I, Ronald T. Bannister hereby certify that I am a registered Professional Engineer in the State of Wisconsin in accordance with ch. A-E 4, Wisconsin Administrative Code and that this report has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wisconsin Administrative Code.

Ronald T. Bannister, P.E.  
Signature, title and P.E. number



WISCONSIN TEMPORARY PERMIT  
# 1791 Ronald T. Bannister

EOG Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Michael C. Vilione  
Michael C. Vilione, President  
EOG Disposal, Inc.

